

NEW
IMPROVEMENTS
OF
Planting and Gardening,
BOTH
Philosophical and Practical;
Explaining the
MOTION of the SAPP
AND
GENERATION of PLANTS.

With other Discoveries never before made Publick,
for the Improvement of Forest-Trees, Flower-
Gardens or Parterres; with a New Invention
whereby more Designs of Garden Platts may be
made in an Hour, than can be found in all the
Books now extant. Likewise several rare Secrets
for the Improvement of Fruit-Trees, Kitchen-
Gardens, and Green-House Plants.

Adorn'd with COPPER PLATES.

The Third and Last PART.

By RICHARD BRADLEY, Fellow of the
ROYAL SOCIETY.

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without Temple-Bar. MDCCXVIII.





To the Right Honourable

JAMES

EARL of *Caernarvon*,

Viscount *WILTON*,

AND

Baron of *Chandois*, &c.

My LORD,

THE best Reason I can
give that these Papers
claim Your Lordship's
Protection is, That they endea-
vour to advance in a small In-

A 2

stance

Dedication.

stance the Good of our Country, and the Benefit of Mankind. YOU are so kind an Encourager of every thing which looks that Way, that I promise my self even this mean Attempt will not fail of some Countenance from Your Lordship, which is the surest Means of its being acceptable to the rest of the World. They who shall happen to profit by this Work, will owe the greatest Debt to Your Lordship, since Your Name will be the best Recommendation of its Worth. But that my Imperfections may not entirely take Shelter under so great an Authority, I do assure Your Lordship,

Dedication.

ship, that I have omitted no Pains to make it as compleat as I could ; and what it still wants of being so, may well be imputed to my Distance from Your Lordship's improving Thoughts, by the short Experience I have had of them in Relation to this Subject ; I am sure that my Observations have lost much for want of so just Corrections.

My LORD,

IT would be as improper in me, as disagreeable to You, to talk of the great Merit and Esteem You stand in with all Mankind. The Publick feels the Benefit of All Your
Actions,

Dedication.

Actions, and will do You Justice without my reminding them. My Hopes of not offending Your Lordship arise wholly from the Usefulness of the Subject of this Work ; and I humbly beg it may be accepted as an Instance, that I can distinguish a little, as well as the rest of the World, in my professing my self,

My LORD,

Your Lordship's most Dutiful

And Obedient Humble Servant,

R. BRADLEY.

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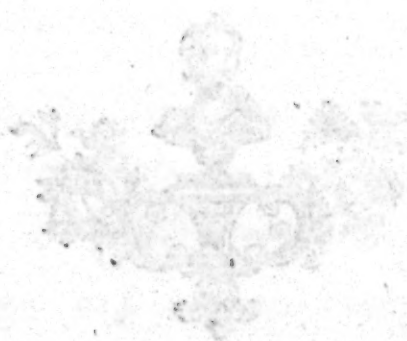
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NEW



NEW
IMPROVEMENTS

OF

Planting and Gardening,

BOTH

Philosophical and Practical.

PART III.

CHAP. I.

*Of the VINE, FIG, L'AZZEROLE,
and MULBERRY.*

THE Fruit I shall first treat of is known all over the civiliz'd Part of the World; and its Qualities more generally admir'd than any other fruit growing upon the face of the Earth: And yet notwithstanding the vast Tracts of Ground in *Europe* and elsewhere, which are found planted at this day with *Vines*, there is hardly any Plant so unskillfully order'd in our *English* Gardens, or so little understood by our Gardeners.

PART III. B SECT.

S E C T. I.

Of the V I N E.

TH E End of planting *Vines* is certainly to have good Store of *Grapes*; but the way to attain a large Quantity of good *Grapes*, does not only depend upon the Choiceness of the Sorts we plant, the Nature of the Soil they require, and the proper Scituation for them; but above all, the Times and Methods of pruning are absolutely necessary to be understood.

The Kinds which I find to ripen best in *England* are, the *July Grapes*, the *Black Currant Grape*, the *Early sweet Water Grape*, lately brought from the *Canaries*, the *Arbois* or *French sweet Water Grape*, which are all ripe with us by the middle of *August*, if rightly managed and the Season be kind, and after them the *Muscadines*, *Parsley Grapes*, *Fronteniacs*, *Claret* and *Burgundy Grapes*: I have seen all these in great Perfection with us, but I know not of any other Kinds early enough to ripen well in our Climate.

'Tis then of these Kinds I would chiefly advise to be propagated, which may be done either by laying down the young Branches as soon as the Fruit is gathered, or by making Plantations of Cuttings at that

that time, always minding to let a Bud or two of the Layer or Cutting be under Ground, for it is from those Buds only the Roots put forth. I have also frequently made Layers in *March* and *April*, which have been fit to transplant the *Michaelmas* following; and I have known it practis'd to draw a young Branch thro' the Hole at the Bottom of a Garden-Pot about *Christmas*, and then filling the Pot with Earth, it has took root and been cut from the Mother-Plant the *Michaelmas* following, with ripe Fruit growing upon it. The *Vines* thus raised in Pots, will hold their Fruit good almost till *Christmas*, if they are shelter'd from the Weather in a Green-house or some such like Place; and it is easy to conceive how pleasant it will be to have them brought thus growing to the Table in a Desert.

By what I have observ'd in planting of *Vines*, the Month of *February* is the best, if the Weather be open, and great care must be taken in the Removal of this Plant, that the Roots be not too dry before it be replanted, for that would greatly endanger it: Therefore wet Moss wrapp'd about the Roots if they are to be sent to any remote Place has been practis'd with good Success.

Concerning the *Soil* proper for *Vines*, I shall give the first Hint from that inge-

mious and candid Piece of Mr. Laurence's, where with so much good Reason he tells us that he cannot easily be brought to think any Soil or Scituation can be too dry for the Roots of the *Vine*; after having seen at *Barnwall* near *Oundle* in *Northamptonshire* a flourishing *Vine* grow from between the Joints of an old Castle-Wall near 20 foot high from the Ground, which he was told produced admirable *Grapes* when it was well managed. This Observation of that curious Gentleman might be sufficient of its self to inform us of the Property of the Soil requir'd for *Vines*, without seeking after other Experiments to satisfy us in it.

In the Gardens of my worthy Friend Mr. Balle at *Cambden-House*, there are now growing several *Vines* in the Walls, some of which were planted there by that Gentleman's Direction, and one in particular, which is a *Muscadine*, produces every Year fairer Bunches of *Grapes*, much sweeter, and earlier ripe (at least a Fortnight) than any other *Vines* in his Garden, altho' he has the best Collection of forward *Grapes* I have yet met with in *England*.

But yet further, if we take a View of the *Vineyards* abroad, which afford the richest and best *Wines*, we find the Soil either rocky or gravelly. The *Chateau* *Vine*

Wine of *Italy*, for Example, grows upon a high Ground in a rocky Soil like to that which they make Lime of, and the strong *Spanish* Wines are the growth of the Mountains, which will hardly produce any other Kind of Plant, they are so extreemly dry: In a word, all the Places which I have seen or heard of, which produces good Grapes, have a dry, hot Soil, and are somewhat Mountainous.

From such Observations, and some Experience I have had in the Culture of the *Vine*, I find chalky Hills, such as are frequent enough in *Oxfordshire*, are very proper to plant *Vines* upon, if they lye well expos'd to the Sun; So, hot gravelly Ground which lies dry and warm, will produce better Grapes than any of the rich Soils prepar'd with Horse-dung; but in a Garden where either of these Soils are wanting, the Rubbish of some old Building will very well supply the Defect, if it be well sifted and mix'd (about one third part) with the Earth about the Roots of the *Vines*.

I think I need not say how much the ripening of some Sorts of Grapes depends upon a good Wall, and warm Exposure, and that even with those helps, we sometimes fail of ripe Grapes. It may not be amiss then, to consider of some ways that may expedite the budding out of the *Vines*, and consequently by making them blossom earlier than usual.

may hasten the growth and ripening of the Fruit while we enjoy the Summer Sun.

As the proper Soil and right Exposure for *Vines* contributes to the early ripening of Grapes, so the right Season for general Pruning likewise is helpful to the speedy perfecting of the Fruit, as I shall shew afterwards; but shall first take notice of an Observation or two of *Vines*, that were made to shoot near two Months sooner than Nature would of her self have given them Motion. In *Kensington* I have observ'd a *Vine*, that happen'd to be planted against a Baker's Oven, to sprout in the beginning of *March*, and continue from that time to shoot vigorously all Summer; and although it had very little Advantage of the Sun's Heat, and grew in a stiff wet Ground, the Grapes ripen'd much sooner than any others of the same Kind: But at the *Pot-House* at *Fulham*, where the Soil is sandy, and the Exposure warm, there was a *Vine* planted against an Oven which was constantly kept hot for baking of Earthen Pots, that began to Bud about *January*, and would, as I am inform'd, have ripe Grapes in *June* by the help of a Glass Frame which was used to cover it in severe Weather; and so to plant a *Vine* against the back of a Chimney where a Wood or Turf Fire is constantly kept, so as to warm the Bricks, it will by that means sprout early, and have its Fruit sooner perfected than
other

other *Vines* which have not that help, as I have experienced.

Supposing then, that a *Vine* by this Means is brought to Shoot or Blossom earlier than usual, let us not deceive our selves with the too common Opinion, that the exposing the Blossom or young Fruit immediately to the Sun, will be a means of hastening its Maturity, or making it large, and as some do, to pull away the Leaves from about it; for that rather retards the ripening, than forwards it, by contracting so much the outside Skin of the Fruit, that it cannot receive the Nourishment it ought, and would otherwise admit of; and I am sure whoever knows any thing of the Growth of *Vegetables*, will allow, that Shade always contributes to the large growth of Plants and Fruits, and that the heat of the Sun is chiefly requisite for the ripening of Fruits; therefore let the young growing Fruit always remain shelter'd with its Leaves till it be full grown, and then begin to lay it open to the Sun for ripening.

I shall next consider the *Pruning* of *Vines*, especially of those growing against Walls, for it is a right knowledge of the Seasons and Manner of Pruning, which chiefly contributes to give us a plentiful Store of good ripe Fruit.

It is commonly practised by the Gardeners, to Prune their *Vines* in *December*, which

Season they hold to be much better then the Months of *January* and *February*; for the *Vines* prun'd in those Months, are apt to bleed away too much of their Strength; and it is as common among them to leave four Buds or Eyes upon every prun'd Branch, whether they are strong or weak Shoots: I have, I must confess, seen *Vines* that have been so order'd, produce good Fruit; but I am assur'd, whoever was to see the *Vines* which are now in Mr. *Fairchild's* Garden at *Hoxton*, would go another way to Work. It is his Method to prune his *Vines* so soon as the Fruit is gather'd; and according to the Strength or Thickness of the Branch he leaves growing, he allows a due Length, a very strong one, about a Yard long, and those of less Vigour are prun'd shorter in Proportion: By this Method of Pruning, I observe he never fails of large quantities of Grapes, ripening very well, and much earlier than any of the same kind prun'd after the usual manner.

The *May* after this Pruning, our *Vines* must be again look'd over, and then disburden'd of the small weak Shoots, rather by breaking them off, than cutting; and such Shoots as have then Fruit appearing upon them, must be top'd so as to leave a sufficient number of Buds above the Fruit upon each Branch, in proportion to its Strength or Thickness, observing always not

to prune nearer to the Fruit than three or four Buds.

In *June* the *Vines* must be examin'd for the third Time; and the barren Branches, which will then be shot to a great Length, should be prun'd to such Lengths as answer to their Vigour, or else taken quite away, if they are not wanted, to furnish some Vacancy on the Wall.

About the Beginning of *August* the Grapes of the forward Kinds will be full grown, and then we may again give a fourth Pruning, in order to expose the Fruit to the Sun for ripening; but yet let it not be left too naked of Leaves, lest it be injur'd from the cold Dews which begin to fall the latter End of the Month.

In the Summer Prunings of *Vines*, due regard ought to be had to the Number of Branches, which the Wall will require to be laid in the Winter to supply the place of old Wood, which should then be taken away; for it is a certain Rule, that no Branches of the *Vine* bear Fruit but such as are the Produce of the last Year; and those, if they are discreetly managed, seldom or never fail to furnish Fruit in abundance.

Thus I have set down what I know concerning the Management of *Vines* against Walls, and shall now proceed to offer some few Hints concerning the Way of ordering them in *Vineyards* for the making of Wine, which

which I am satisfied may turn to as good Account in *England* as they are known to do in many Parts of *Germany*.

If a *Vine* will prosper upon a Chalk, as we are certain it will, how trifling would be the Expence to plant an Acre of such Ground with *Vines* in some well-expos'd Place on the Declivity of a Hill: The yearly Income of such Land can hardly be a Shilling, if it be strictly Chalk; and the *Vines* may be rais'd, as I have directed, with very little Trouble; and then for the Charge of Planting, a Week's Work for a Man would more than do it, seeing there is no Necessity of Manuring the Ground: The whole Expence before they began to bear Fruit, which would be the third or fourth Year after Planting, could hardly amount to twenty Shillings; so that I see no room for any Objection upon that account: The chief thing will be to shew, upon reasonable Grounds, that Plantations of this kind will produce ripe Fruit, and that I think may be made appear very plainly.

In the first place plant only the forward Kinds of Grapes, which have often enough been experienced to ripen in open Borders, without the Help of a Wall; witness the Vines at a *French Gardener's* at the Back of *Swallow-Street, London*; those at the Honourable — *Johnson's, Esq;* at *Twittenham*; the *Vineyard* near *Bath*; that near *Greenwich*, and almost in every Nursery.

2dly,

2dly, The Chalk-hill, which I propose to be planted with *Vines*, will certainly reflect as much Heat upon the Fruit as any Wall whatever; and every one knows that the Cold in those Parts of *Germany* where the *Rhenish* Wines are made, is much more powerful than what we feel in *England*; so that since we need not be apprehensive of too much Cold in the Winter, and may reasonably expect as much, if not more, Warmth in the Summer, our *Vineyards* may certainly afford us as good Wine as what we receive from the *Rhine*, and some places in *France*, and consequently turn the Owner to Account.

But that we may answer every Objection that may be made against planting of *Vineyards* in *England*, give me leave to recite what I have heard relating to the making of Liquors with unripe and sour Fruits. In *Devonshire* a Gentleman made a Vessel of *Verjuice* of Crab or Wilding-Apples, which being placed in his Cellar among other Liquors was not used 'till about three or four Years afterwards, and was then found to be so palatable and exceeding pleasant, that he now prefers the Liquor made of such wilding sour Fruit (after it has had time to digest) rather than any *Cyder* of that Country: So I have known *Verjuice* made of half-ripe Grapes, that after two or three Years keeping in a Vessel has become delicate Wine; and the *Rhenish* Wines, when they

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They are newly made, are so Sour, that they
are not fit to drink, but after several Years
standing afford us that incomparable Liquor,
which is call'd *Old Hoc*; and on the con-
trary Sweeter Liquors are apt to turn sour by
keeping, which is one Argument to prove
that a continued Motion and Alteration of
State of every created Atom, is requisite
to support the Frame of Nature; and as
I conceive, was it possible that any one
the least Particle of Matter could be de-
stroy'd or lie still, all Life and Being must
cease; such Dependancy has the greatest
Bodies upon the smallest Beings, or the most
inveterate Opposites upon one another. The
skilful Chymist knows how to separate the
differing Parts subsisting in Liquors from one
another; the Volatile Spirits from the more
watery Parts, and those from the more oily;
so that we find every Liquor contains a
Grain of certain Qualities; and Liquors are
only differing, in that one has perhaps
the Acid more prevailing, the other the
Alkali, or either of those Powers more or
less predominant at certain Seasons. The
Season when it prevails in any Liquor, is
not without the Sour subsisting in it, altho' it
is not power to appear till its Opposite be
destroy'd; and so the Sour is not with-
out a Grain of Sweet, altho' it is not
power to appear till the Acid is destroy'd; and
so the Acid is not without a Grain of Bitter, altho'
it is not power to appear till the Alkali is destroy'd.
I shall forbear advancing any
fur-

Planting and Gardening.

further at this time in so vast a Field, and proceed to the Business in hand; That our Chalk Hills, and those that are accounted the most barren Mountains in *England* are very proper to plant *Vines* upon, and the higher the better; for 'tis observable that several *Vineyards* in one Country, planted with the same sort of *Vines*, produce very different Wines; those on the Tops of Hills much stronger and better than those which lie lower; insomuch that one Barrel of the Mountain Wine will sell for much more than that growing in the Valley; and so far as I can learn, the strongest Wines are always the Produce of the highest Mountains.

To plant a *Vineyard*, let the Place where each *Vine* is to stand, be open'd and prepar'd before any of the Plants are taken out of the Nursery; let them stand a Yard asunder in Lines, and the most proper Season for their planting is in the first open Weather in *February*. It is usual to prune these *Vines* according to their Strength the *September* before transplanting, leaving not more than four Buds on the strongest, and then they will require no other care the first Summer but to keep them clear from Weeds; about the End of *September* after planting, shorten the Shoots of that Summer according to their Strength; and the Summer following the strongest of them will begin to show little Fruit; this second Year the branches

the small Shoots and superfluous Branches should be carefully done in *May* and *June*, and two or three Shoots only maintain'd on each Vine, according to its Strength, and those not to be shorten'd till the *September* following; these should be supported by Stakes or Poles, so that they may not run close to the Ground, but about a foot above it, least too much Wet spoil and rot the Fruit; for the nearer the Ground the Grapes grow, if they do not touch it, the riper and sweeter they will be, and the stronger the Wine. In a word, continue from time to time this Method, to preserve young strong Shoots every Year to bear the following Summer, in Proportion to the Strength of every Vine, cutting away all the old ones, which (were they to remain) would only rob the Plants of their Strength.

But if not withstanding all the Care of pruning and weeding the *Vineyard*, the *Vines* are not inclin'd to produce large Bunches of Fruit, lay Ox's Blood or Carrion to their Roots about *November*, or, as it is very common in all the *Vineyards* abroad, manure them with humane Dung that has lain some time to meliorate and has lost its Odour. This way of enriching Ground has very evidently the best Effect upon Fruit Trees of any other Manure whatever, but *Vines* chiefly, which will not bear any other.

With

With this Management, I doubt not that our *Vineyard* will produce good Store of Grapes in 5 or 6 Years after planting; and if the Owner should be then disposed to try what Wine they will produce, let him gather the Fruit when they are full ripe in dry Weather, if possible; then put them in the Fatt, and have them trodden by Men to press out the Juice without breaking the Stones; or where the Quantity of Grapes is not large, to press them with the Hands will do as well, and seems more cleanly: The Liquor thus press'd, should stand in the Fatt about 15 Days with the Husks and Stalks in it to ferment if the Grapes were dry when they were gathered, otherwise not much above half that time before the Wine be drawn off, least it turn sour, as it will be apt to do if the Grapes were gather'd wet. Some who are very curious in their Wine, pick off the damaged Grapes from the Stalks, before they make the Wine, which is so rich in its Flavour, that to compare it with the Wine made the common Way from the same *Vineyard*, it does not appear to be of the same Growth.

It is observable, that according to the Management of the *Vines*, the Wine is stronger or weaker: Those *Vines* which have their liberty to run up high Trees, and are never pruned, afford the smallest Wines; others which are kept pruned, and have their Branches tied to Stakes about four foot high
make

make stronger Wine than the former; but the strongest of all, is made of those Grapes which grow near the Ground, as I have directed, and are sometimes after gathering hung up to dry for three or four days before they are press'd, which they say exhales the watery Parts.

S E C T. II.

Of the Fig.

THE *Fig* delights in the same Soil with the *Vine*, and may be propagated either from Suckers or Layers, and also from Seeds. The Suckers are best separated from the old Roots the Beginning of *March*, and should then be transplanted without cutting any of their Tops; for this above all other Trees suffers most by Amputation; and indeed should never be pruned if it could be avoided: The Layers should be order'd like those of the *Vine*, and the Seeds as I have been inform'd, will readily come up if they are sown in Rubbish, or such like Soil, about *March*. It is most commonly practis'd in *England* to plant *Fig-trees* against Walls, because it has been thought the Fruit would not otherwise ripen in our Climate, but that is a Mistake; for in several Gardens about *London* I have seen them grow in Standards, and prosper and bear Fruit in more abundance, and much

much better, in my Opinion, than any I have yet seen against Walls; for as they are endanger'd by pruning, so they like as little the Confinement they are obliged to against Walls.

I have been told of a *Fig-tree* near *Windsor* (that grows wild without Culture in an old Gravel-pit) which is so extreamly large, that many Bushels of *Figs* are gathered yearly from it; and I know of some old *Fig-trees* that have been neglected for many Years, which bear more Fruit than any that I have ever seen dress'd and order'd in Gardens; and it is the common Practice abroad to plant them in certain Places of their *Vineyards*, and let them grow after their own Manner without any Interruption, so that with very little Difficulty this Tree may be cultivated. The only Art requir'd in its Management, is to preserve the 2d *Figs* during the Winter, that the severe Weather do not make them fall from the Tree, but that they may be maintain'd in Health to ripen early in the Summer. I remember to have seen at the late Bishop of *London's* Gardens at *Fulham*, ripe *Figs* in *May*, which were brought to that forward Perfection by keeping them in Pots, and sheltring them all the Winter in a *Green-House*.

Tho' with us we have not many Varieties of this kind of Fruit, yet are there as many Sorts of *Figs* as of any other Fruit,

which in *Spain* and *Italy* are held in great Esteem. The *White Figs* chiefly are valued by the Curious for their delicate Flavour, and early Ripening.

S E C T. III.

Of the L'AZZAROLE.

THE *L'Azzarole* or *Neapolitan Medlar* is a kind of *Service*, producing very pleasant Fruit, as I have heard from some curious Gentlemen who have eaten of it in *Italy* where it grows frequently: Of late Years it has been brought into *England*, and cultivated in several Gardens, where I am inform'd it has produced Fruit; it boldly resists the Severity of our Winters, and is well inclin'd to grow with us either in Standards or against Walls. I have propagated it three several Ways, by Budding it upon the *Hawthorn* in *July*, by Grafting in the Cleft in *March*, and by Inarching in *May*; so that the Admirers of this Fruit may be easily stock'd with it, if they are provided with a Nursery of *Quickset*. It loves a holding fat Soil.

S E C T.

S E C T. IV.

Of the MULBERRY.

WE have two Sorts of *Mulberry*, the *Black* and the *White*; the First is the most common in *England*, a slow grower, and chiefly famous for its Fruit; and the *White Mulberry*, which grows extremely quick, has indeed a small insipid Fruit, but is no less deserving then the other on account of its Leaves, which are the proper Food of the *Silkworm*.

The *Black Mulberry* is an Autumn Fruit, so tender when it is Ripe, that it will not bear the most gentle Carriage without bruising; it is a Catkin-bearing Tree, producing Male and Female Blossoms at the same time, and it is noted by some, that it never Buds till the Weather be settled Warm; wherefore it has been laid down as a Rule, That *Orange-Trees* may be brought out of the Conservatory, as soon as its Leaves are as large as a Crow Foot.

I do not remember ever to have seen this kind of Tree with a streight Stem of any good height, or will the common way of raising it, ever produce (in my Opinion) any better then I have seen; 'tis therefore I would advise that it be inoculated or grafted by approach upon Stocks of the *White Mulberry*, which naturally grows streight,

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and will make a handsome Tree very quickly. I am well assur'd this would do much better than raising them by Layers, which is the common way, or from Seed, as some have practis'd.

The *White Mulberry* may be increas'd either by Seeds sown in *March*, or laying the youngest Shoots into the Earth at that time. The Seeds will sprout about three Weeks after sowing, and be near six Inches high the first Summer, and the Layers will be fit to take off the Spring after they are laid into the Earth.

By either of these ways we may soon raise store enough of young Plants to supply a large quantity of *Silk-Worms*; for which end the *Chineses* sow large Fields of this Sort of *Mulberry* to mow them down from time to time as they have occasion; and the People of *Italy* plant Trees in the Roads, and every vacant corner of their Ground. I have heard of a Man near *Utrecht*, who has lately began the Trade of Silk, and the last Year, as I am inform'd from good Hands, made ten or twelve Bales of *Silk* from his own *Worms*: And, so far as I can understand, were *Silk-worms* more regarded in our Climate, they would do as well with us as they do in *Italy*, where they are subject to so many Hazards, but chiefly to be spoil'd by the violent Thunders frequent in those Parts: No Man there, is certain of a good *Silk-Harvest*,
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till the Worms have actually spun their Silk ; for if Thunders happen to come just when the Worms are going to Spin, they will immediately drop, and infallibly perish. It would be well to try whether the firing of Guns near such Trees as are infested with Caterpillers, will not destroy those Insects.



CHAP. II.

Of Kernel-Fruit, such as the APPLE, PEAR, MEDLAR, QUINCE.

SECT. I.

Of the APPLE-TREE.

HERE is no kind of Fruit better known in *England* than the *Apple*, or more generally cultivated. It is of that Use, that I hold it almost impossible for the *English* to live without it, whether it be employ'd for that excellent Drink we call *Cyder*, or for the many Dainties which are made of it in the Kitchen : In short, were all other Fruits wanting to us, *Apples* would make us amends.

It may therefore be expected, that I should be the more particular concerning the Culture of this Tree, but considering how many

have writ of its Management, and how generally it is propagated with good Success, I shall not enlarge upon it so much as otherwise I should have done.

To set down the several various Names of *Apples*, would be a Work almost impossible, seeing how many various kinds are yearly produced from the Kernels in almost every County in *England*; and where they happen to prove good, either for making *Cyder* or Table-use, have Names given them according to the mind of the Person that rais'd them: However, as every Kind of *Apple* will not do well in *Espalier*, I cannot well avoid mentioning those few sorts which I have approv'd to be the most proper for Hedges, and the rather because their Names are generally known to every Nursery-Man about *London*. For that use then, the *Codlin*, the *Non-pariel*, *Golden-Pippin*, *Kerton-Pippin*, and *Holland-Pippin*, seem to be the best: I have found these Kinds to bear plentifully, and produce Fruit upon their lowest Branches; and I am perswaded whoever delights in Gardens will not be without *Espaliers* of them, as well for the sake of the great quantity of Fruit they will produce, as for the Ornament they afford to a Garden, and the good Shelter they yield to all the under Race of Kitchen-Garden Plants which are encompass'd with them.

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I have found this good by enclosing the Quarters of a Kitchen-Garden with Espaliers of Fruit, that as they loose their Leaves in the Winter, they then obstruct none of the Sun's Rays from passing directly to the Herbs planted within them; and in the Summer when they are cover'd with Leaves, they afford that Shade which is so requisite for the good growth of many Plants; and besides these Conveniencies, being tied up to Poles and kept in good Order, the very Borders they are planted in are as capable of receiving into them Herbs or Flowers, as if they were plain and open, and not any Trees planted on them.

The *Codlin*, which is the first of the *Apples* I have named for this use, is propagated from Suckers taken from about the Roots either in *November* or *March*, and the other sorts are increas'd by grafting upon *Crab-Stocks* in *March*: If they are design'd for tall Hedges, or if for Dwarfs, or for Espaliers of small heights, then upon *Paradise-Stocks*; the Soil which these and all other *Apples* seem to delight in, is a medium Earth between Sand and Clay, which they prosper in if it be fresh, rather than with a mixture of Dung among it.

I find, from Experience, that all *Kernel-Fruit* suffer greatly by Pruning, and it is by the unskilful Management of the Knife they so frequently are apt to canker, and

sometimes quite perish; for my own part, that I may somewhat curb the use of the Knife, I choose to break off the Buds, which would produce luxuriant Branches, when they first appear, rather than leave them to be cut from the Trees when they are full grown, which is commonly when the Sap is at rest. In *May* it is easy to discern what Buds are shooting for our Use, *i. e.* which will become Branches either to fill the vacancies of our Espaliers, or make Fruit-Branches; and it is at that time I disbud the Tree of the others which I esteem useless, for then the Sap will heal the Wounds.

An ingenious Person who knows that the Shoots of *Apples*, *Pears*, and such like *Kernel-Fruit*, will not bear till they are two Years old, will always contrive to lay in store of Branches every Year into his Espaliers to succeed one another in Fruit-bearing; for the same Branches will produce Fruit but once, and when that is over (in Espaliers) they should be taken away in proper Season to make room for the others which are coming forward. Such Pruning indeed cannot be avoided on Espaliers, no more than taking away the Autumn Shoots; but the disbudding them in *May* will prevent a great deal more, which otherwise there would be occasion for; so that upon an Espalier well order'd, we ought to see Wood laid in of three Summers, the one with Fruit, others to

to knot for Blossoms, (which work Nature always contrives to do in the Bud, the Year before they Blossom) and the third sort new Shoots to follow in their turn; for Example, In *August* of this present Year, 1717, there ought to be upon our Espaliers about one third of the Branches with Fruit, one third of the Branches which have shot this Year, and the like proportion of Branches knotted to blossom the next Spring. About *Midsummer* is the best time to tie the Shoots of that Summer to the Espalier, and disburden the Tree (especially if it be weak) of its superfluous Shoots; let the Branches be tied about four Inches apart at least, for nearer than that Distance would be too close; Hedges thus dress'd would not be subject to overbear themselves, but give every Year a moderate proportion of Fruit large and good.

It is observable, that some of the Summer Kinds of *Apples* and *Pears* will produce Fruit upon the Branches that shot the Summer before, and upon such Trees the Wood of two several Years may only be left; but the Winter-Fruits which ripen late, are always the produce of older Wood.

Between Leaf and Leaf, the Gardeners commonly find their time to prune off all the Autumn Shoots, as well from their Standard-Trees, as from their Espaliers; and then disburden them from such Wood likewise as they

they judge unprofitable; but the Skilful have always this Rule before them, that the most weak Trees are first prun'd, and those which are very luxuriant are left 'till *March*.

The Planting of *Apples* or *Pears* for *Espaliers* is best done at the Fall of the Leaf, leaving about ten or twelve Foot between Tree and Tree, and the Rails made of *Aspen Poles* may be put up the following Summer.

For *Dwarf-Apples*, I believe every one will allow that those grafted upon *Paradise-Stocks* are the best, I mean for their keeping in a small Compass, and bearing abundance of Fruit with very little pruning: I have known them frequently cultivated in Pots, sometimes so full of Fruit, that the *Apples* themselves have weigh'd more than the Tree, and the Pot they grew in. At great Entertainments, how delightful would it be to set several sorts of *Apples*, growing, upon the Table! It would be a kind of movable Orchard, which could seldom fail to bear good Fruit, as the Trees might be shifted from place to place, either to put them out of the way of Blasts, or place them in the Shade for Improvement of the Growth of the Fruit, and in the Sun for the due ripening them.

Paradise-Stocks are raised with us by planting the Cuttings of them in *Autumn*; they strike

strike Root and grow freely, so as to be fit to graft on in two or three Years ; they are brought originally from *France*, but now they are to be met with in almost every Nursery about *London* ; and for *Standard* and *Hedge-Apples*, *Crab-Stocks* taken out of the Woods, or *Seeding-Plants* of about three Years old, are the best.

There are two ways of Planting an Orchard ; the one to make it entirely for Fruit, the other to plant the Trees at such Distances as to admit of an Under-crop. I must confess, was I to make an Orchard to please myself, I would first divide the Ground into Parcels, allowing handsome Walks between them, which should some of them be fenced on the Sides with *Espaliers* of Fruit, others left open with Borders only on their Sides, adorn'd with Rows of *Standard-Apples*, such as *Golden-Pippins*, *Golden-Renets*, *Russet-Pippins*, *Kitchen-Renets*, *Pairmains*, *Green-Russets*, and such like serviceable Fruits that will remain good for several Months.

In these several Quarters plant your Trees at about sixteen Foot distance, if you design a close Orchard, or near thirty Foot asunder if the Ground is design'd for *Beans*, *Peas*, or such like Under-crops. In Planting this Ground for either Purpose, supposing it three Acres, let two Thirds at least bear *Apples*, and the Remainder be allotted for *Pears*, *Plums*, *Cherries*, and a *Mulberry-Tree*

Tree or two : The Ground thus planted may be fenced about with Hedges of *Philbuds* and *Berberries*, to make it still the more compleat and delightful.

S E C T. II.

Of the PEAR.

THE *Pear* in my Opinion is a Fruit no less pleasant than the *Apple*, altho' it is not of that general Use, however we are beholding to it for no small Entertainment in the Winter when other Fruits are scarce, whether we eat them raw, or baked, they have their Excellencies : The Varieties of *Pears* are almost without Number, if we were to joyn the several *French* Sorts to the Catalogue of those rais'd in *England* ; but as I suppose every one would rather propagate a few good Sorts that bear well, and follow one another in right Season, than croud his Garden with useless and unprofitable Trees ; I may therefore be excus'd inserting a tedious List of their Names, and give the desir'd Satisfaction to my Reader, if I mention only those Kinds that may bring him Profit and Pleasure, and those I shall set down as near as I can remember in the Order they ripen : The first ripe is the little *Muscat*, and then I would recommend the *Katherine-Pear*, which is indeed a common Fruit, but is nevertheless

less of an agreeable Flavour : The *Windsor-Pear* likewise is in my Esteem, tho' it is an *English* Fruit well worth our propagating : About the same Time are ripe the *Quisse-Madam*, *Summer Bon-Chretien*, and *Summer-Bergamot*, and indifferently good, but especially the latter ; then the *Orange-Bergamot*, and the first *Bureé-du-Roy*, exceeding good ; and after these the *Lemon-Pear*, *Bergamot*, *Grey-Bury*, *Virte-Longue*, *Green Sugar-Pear*, *Messire-Jean*, and *Crysan* ; then ripens the *Winter Thorn-Pears*, *Virgolues*, *Leschafferies*, and I think also the *Sweet-William Pears* ; some of which last continue part of *December*, in which Month the *St. Germain* and *Martinsec Pears* are also beginning to ripen, and will hold good all the *January* following, 'till the *Winter Bon-Chretians* supply their Place ; all these are *Eating-Pears* ; and for the *Baking Kinds* that are the best I know of, they are the *Wardens*, *Black-Pear* of *Worcester*, and *Spanish Bon-Chretien* ; these, if they have time enough to stand in the *Oven*, will bake extreamly tender, and very red ; but particularly will be of a most beautiful Colour if they are baked in *Tin* or *Pewter-Vessels* close cover'd, as has been often experienced ; but indeed 'tis no wonder if by this Means they are better colour'd than those that are baked in *Earthen-Ware*, if we consider that 'tis a *Solution of Tin Oar* that makes the so much

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admir'd *Beau-dye*; and I doubt not but if such as dye Scarlets made use of Tin or Pewter-Vessels, rather than Copper, it might save them somewhat in the Expence of *Cochineel*, or such other chargeable Ingredients. *Pears* are either grafted in *March*, or inoculated towards the latter End of *June*; and two sorts of Stocks are made use of for those Purposes, Wildings or Kernel-Stocks; and oftentimes such as are taken from about the Roots of old Trees, and planted in Nurseries, are good for *Standard-Pears*, because they put the Graft or Bud forward, and tend to make large Trees; but *Quince-Stocks* are much better for such *Pears* as are design'd for Dwarfs, low Walls, or Espaliers, because they confine the Growth of the Graft or Bud, and produce Fruit quickly, and near the Ground.

The Soil which the *Pear* chiefly delights in is a wet Earth inclining to Clay; nay, I have seen this kind of Tree prosper extreamly in the strongest sort of Blue Clay, which is accounted the worst of Soils; so that this Sort, no more than the Apple-Tree, delights in what we call Rich Earth. If indeed one of this sort of Trees seems to decay, encourage it at the Root with Carion, or the Blood of some Animal, for that has a wonderful Effect upon all kind of Fruit-Trees; and I believe would have the like upon every sort of Vegetable, as we have experienced
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Shavings of Horn, Srips of Leather, Wool, or the Entrails of Fowl, or such like Parts of Animals will have upon those Plants, whose Roots they are laid to. It seems therefore as if the Animal and Vegetable were made for the Support and Food of each other; the Plants to nourish the living Animals, and the dead Animals to feed the Vegetables.

In the Pruning of *Pear-Trees* the same Method ought to be observ'd as for *Apples*; they delight not in a Knife, and especially those grafted upon *Quince-Stocks*. Upon the cutting off any large Branch (if it happen to be necessary) cover the Wound with a Mixture of Tar, Rozin and Pitch, immediately after the Amputation, which will prevent ill Distempers, which the Wound would otherways be apt to bring upon the Tree.

I am no Admirer of *Dwarf Pear-Trees* in a Garden, because their Figure is commonly too much studdy'd and confin'd to afford us a good Quantity of Fruit; for it is almost impossible to have both together in Perfection; and besides they take up too much room. I remember a fine Seat near *London*, where about four Years ago the Gardens abounded in *Dwarf Pear-Trees*, which altho' they were prun'd with tolerable good Skill, never produced any Quantity of Fruit, 'till at length they were laid into *Espaliers*, and have born Fruit every Summer

Summer since in great Plenty ; and I believe there was not gain'd to the Garden less than half an Acre of Ground, by that Disposition of them.

Let such *Pears* as are planted against Walls be well secured from the *East* ; for altho' the Fruit, in its Kind, be good and hardy, the Eastern Blasts of the Spring coming upon it, thickens the Rind, and fills the Fruit full of Knots as hard as Stone.

The Espaliers for *Apples* and *Pears* should be about six Foot high, that there may be room enough for the Fruit-bearing Branches to be laid into them. And we ought likewise to observe, that the *Summer Pears*, *i. e.* such as have their Fruits ripen upon the Trees, are the most proper for Espaliers, because they are more subject to bear near the Root, which the *Winter Fruits* seldom or never do ; so that it would be to little purpose to plant the *Bon-Chretien*, and such like lasting Fruits, in Hedges, or against Walls, that are not at least ten or twelve Foot high.

There is a Method, which has been experienced by some of my Friends, to transplant large Trees of Orchard Fruit. One of my Acquaintance had an Orchard of *Apple* and *Pear-Trees*, that had stood about twenty Years ; the Trees were in good Health, and bore Fruit plentifully ; he had occasion to remove to another Estate, about a Mile from this Orchard, and resolv'd to attempt the Removal

moval of his Fruit-Trees with him, for which End he open'd Trenches about the Roots in *November*, and at the same time made Preparation to receive them into his new Garden, by making Holes big enough to admit of the Clods of Earth he design'd to transport with each Tree. Soon after the Frosts began to be violent enough for his Purpose, and so harden'd the Earth about the Roots, that with Leavers he rais'd his Trees out of the Ground, without breaking any of the Earth from them, and convey'd 'em upon Sledges to their several Stations in his new Garden, where they remain'd in the State they were brought, without closing any fresh Mold to their Roots till it began to thaw, and then he finish'd his Work by filling up the Trenches and treading down the new Earth very close.

About a Month after they were thus fix'd, he discreetly pruned off about one third of their Boughs, as near as he could guess, to answer the quantity of Roots they had lost, and the following Summer had a good parcel of Fruit upon them. No less useful than this Method, would be the Removal of young Trees at *Midsummer*, which I believe would succeed very well, tho' I have not try'd it; for the last Summer Mr. *Furber*, a very ingenious Nursery-man at *Kensington*, removed at that Season several sorts of *Ever-greens*, which are now growing, and in much better

Health than some others that he transplanted in the last *Autumn*. As I conceive the Sap of every Tree to be at rest about *Midsummer*, their Transplantation may then be perform'd with as much reason, as the Removal of them at the common Seasons used for that Work; for they have then more time to strengthen themselves, and form their Roots before *Winter*, than those planted at *Autumn*, and will undoubtedly be better prepar'd to make strong Shoots than any Trees that are planted in the *Spring*; but whether those Trees that shed their Leaves will fare as well by this Method as *Ever-greens*, may be try'd.

I shall now conclude this Section with acquainting my Reader, that such Fruit as does not ripen upon the Trees, should not be gather'd till *Michaelmas*, and then only in dry Weather, if possible, without bruising, and lay'd singly upon Shelves cover'd with dry Moss, if it can be got, or for want of it, upon Wheat-straw, giving it Air by opening the Windows of the *Fruiterie* (or Room it is laid in,) till the Frosts begin. Some choice *Pears*, which ripen late in the Year, may be yet preserved by hanging them up by the Stalks to the Ceiling of the Room; and I have known some curious Persons wrap them in Paper, and hang them up till they were fit to eat.

S E C T. III.

Of the MEDLAR, and QUINCE-TREE.

THE *Medlar*, contrary to all other Fruits is not fit to eat till it is rotten or decay'd, and as it is then agreeable to some Palates, I shall therefore give the Culture of it. It delights in loomy, natural Soil, and requires little Sun. It is propagated by graffing it upon the *Hawthorn* in *March*, and is only fit for Standards, in the most remote Parts of the Garden.

The *Quince* is raised either from Layers, Cuttings, or Suckers taken from the Root; it is a natural Fruit which does not require graffing, and comes early to bear: The young Twigs may be laid into the Earth in *February*, or the Cuttings planted in *November* strike root without Difficulty. This Plant loves a moist Soil, and Shade, and the Fruit, in my Opinion, exceeds all others for baking.



C H A P. III.

Observations and Experiments relating to the Propagating and Culture of Stone-Fruit-Trees.

THE Fruits which may be comprehended under the Title of *Stone-Fruits*, are, *Peaches, Nectarines, Abricots, Plums, Cherries* and *Almonds*; all which (the *Cherries* excepted) are so nearly ally'd as to make, as it were, one Family. What Directions I shall lay down for their Management will rather be in general than in particular, seeing how impossible it is to know every particular Soil, or the Disposition of every different Tree, which if they were known would require as many various Ways of ordering. *Monf. de le Quintinye* has indeed given us a very elaborate Piece relating to *Fruit-Trees*, endeavouring to ascertain the Method of pruning them, but how seldom do we meet with any Trees just in the same State of those he mentions; and if by chance we do happen to find such, how difficult is it to comprehend rightly his Meaning: I cannot therefore avoid giving all due Commendations to the Ingenious *Mr. Laurence*, who is the first, I know of, that

that has reduced those Difficulties in the ordering of Fruit-Trees to plain Reason, and has given us such useful Experiments, whose Consequences may best lead us to the right way of Practice in this Point. To proceed then upon the foot of Reason and Experience, as far as my Capacity will permit, I shall begin with some Observations upon the Nursery, whose Soil should be inclining to Loam, a medium Soil between Sand and Clay, and not any ways enrich'd with Dung; for if the Nursery be richer than the Garden, the Trees never thrive when they are transplanted; therefore always contrive to plant them from bad into good Ground. About September make your Plantation of Suckers taken from the Roots of the *Muscle-Plum*, the *white Pear-Plum*, or the *black Damask*, which are good to inoculate *Peaches* upon, but must not be budded till *July* in the second Year after they have been planted in the Nursery. I have observ'd that *Peaches* prosper most that are budded upon *Almond-Trees* raised from the Stones. *Almonds* are to be put in the Ground as soon as they are ripe, and in one Years growth may best be inoculated, for they are too apt to *Gum* when they are older.

Nectarines and *Abricots* may likewise be budded upon any one of the *Plum-Stocks* I have mention'd taken from thence, and will prosper

prosper much better than if they were inoculated upon the best Sorts of *Plums*.

The Stones of *Black-Cherries* should be sett or sown in *Autumn*, to raise Stocks to graff all other Cherries upon; they should be planted out the second Year after they are come up in Lines, about two foot apart; and the like distance should be preserv'd between all other Stocks that are design'd to graff on.

Cherries prosper best if they are grafted, which is contrary to *Peaches* and *Nectarines*, that will rarely be made to thrive but by Inoculation; all these are subject to *Gum*, which *Kernel-Fruit-Trees* are not, but the *Peach-Trees* and *Abricots* suffer the most by it, and often lose whole Arms by a Canker that always attends the *Gum*, which comes commonly by unskilful pruning, but more especially by cutting into the old Wood at the *Midsummer* Pruning; therefore at that Season take off as few Shoots as possible near the old Wood, but nail up slightly as many as can conveniently be laid to the Wall, to be more regularly disposed the *February* following, which is the best Season for the capital Pruning of *Stone-Fruit-Trees*, then may every bearing Shoot be topp'd, or cut, to leave about six or eight Inches, according as they are strong or weak, and all cross-growing Branches, dead Wood, and the Shoots

Shoots of two or three Years old, must then be entirely cut out; for it is a certain Rule, That all *Stone-Fruit-Trees* only bear Fruit upon the Shoots of one Year old, which may be distinguish'd from barren Shoots, by being smaller and better supply'd with Buds. I would advise that a Mixture of *Tarr*, *Pitch* and *Bees-Wax* be lay'd upon any capital Wound, or else that it be burnt with a hot Iron to prevent *Gum* issuing from it.

I account List of Cloth to be much better for the nailing of these Trees than Leather, which is apt to shrink by change of Weather and bind too much the Shoots which are encompass'd by it: It is by such Bindings that oftentimes good Branches are wounded, and by that Means perish; and therefore it is good to let them have room enough allow'd for them to swell, without any Pressure upon them. In *Holland*, and some Parts of *Flanders*, they have Frames of Wood in the manner of *Espaliers* set against their Walls, about 4 Inches distant from them, and the Reasons the Gardeners there give for so doing is not (I think) unworthy our regard. In the first place, they say that their Trees being 4 Inches distant from the Wall, the Fruit is not apt to be destroy'd or spoil'd by Vermin, nor bruise'd or grow mishapen: They say further, that the Wall reflects a Warmth to that side of the Fruit growing next to it, which has the same Effect

as to the ripening of it, as if the Sun was to shine on both Sides of their Fruit, and so prevents that unequal Relish, which is found oftentimes in one single Fruit which grew close to a Wall. To which they add, that in this Method the Trees need not be planted so close to Walls, as to want a sufficient quantity of Earth on every side of their Roots, which those commonly planted in the ordinary way must do on that side next to the Wall; and also that the Twigs of the Trees being tied with *Bast*, saves the Expence of *Nails* and *Shreds*, and will not be so subject to canker by too straight binding. And if I may add one Reason more towards the recommending these Wall-Espaliers (if I may so call them) it should be, that those Poles, which run horizontally, may be so contrived as to serve for Shelter to the *Blossoms* and young *Fruit*, from those *perpendicular Frosts*, which oftentimes are so injurious, as the Curious Mr. *Laurence* judiciously observes.

I have mention'd, among other Observations, in the Chapter of *Kernel-Fruits*, that the Easterly Winds commonly are apt, when they blow directly upon *Pear-Trees*, to spoil the Fruit, by filling it with stony Substances; and no less prejudicial are they to the Blossoms of every forward blowing Tree, if it lie in their way; therefore I cannot recommend the Planting of *Abricots* in such Places, where the East-Winds may blow

blow upon them : For I observe, that in *March* those Winds are always most frequent ; and if they happen to come without Wet, they are infallibly attended with Blasts, as I shall endeavour to explain in another Place. I find that *Abricots*, planted against a West Wall, where they are shelter'd from these murdering Winds of the Spring, seldom fail to produce good Store of Fruit, while on the other hand all others in different Exposures often fail of Fruit, unless they have been guarded by artificial Shelters, such as I have seen in the Right Honourable the Lord *Parker's* Gardens, (I think) contrived by his Lordship ; they are Matrasses of Straw, fix'd in Frames of Wood, about four Foot wide, and seven or eight Foot high, which are made to remove at Pleasure ; so that they may always be so placed, as to interpose between the Wind and the Tree, without stifling the Blossoms, or beating them off as Mats commonly do.

In the Grafting, or Budding of *Stone-Fruit*, I have observ'd, that such Trees as are inoculated near the Root of the Stock, are much more apt to shoot out unprofitable luxuriant Branches, than those that are budded, or grafted, five or six Foot from the Root. I find the latter to make Fruit-Branched in such plenty, that hardly any Barren-Shoots are found upon them, which seems to happen, for the same Reason I have mention'd

mention'd elsewhere, that too great plenty of Nourishment is ever a hindrance to the bringing forth of Increase, as well in *Animals* as in *Vegetables*; and that a Luxuriance of Growth in either, must always be checked to make them prolifick; so the length of Passage in these Standards, which the Sap takes in its Ascension from the Root, thro' the *Plum-Stock* before it reaches that Part where it is to alter its Property in the Bud of the *Peach*, must, I think, contribute to weaken it, and rob it of that Luxuriance which it would have had, if it had been permitted to push out Branches near the Root, where undoubtedly it was more strong and vigorous.

The several Kinds of *Stone-Fruit* may have different Scituations and Exposures; *Peaches* for Example, and *Nectarines*, with some forward *Cherries*, such as the small *May-Cherry*, and the *May-Duke*, with a forward *Plum* or two, should have a South-Wall; and if the Wall happens to be very high, I would advise it to be planted double (*i. e.*) with Dwarfs and Standards, that it may the sooner be cover'd.

Abricots, some choice *Pears*, and a few *Peaches*, may be the Furniture of a West Wall; and some forward *Grapes* (for they blossom when Blights are commonly past) with some *Plums* and *Duke-Cherries* against an East-Wall; and to the North-Aspect we may
set

set *Plums*, some *Winter-Pears*, *Carnation*, and *Morella-Cherries*, with some *Golden-Pippins*.

Plums will also do well in Standards; and all sorts of *Cherries*, excepting the small *May*, and the *May-Duke-Cherries*, prosper best when they have Liberty. *Almonds* likewise will bear very well in the open Ground; and the *Bruxelles Abricot*, whose Fruit is so excellent, will bear plentifully without the help of a Wall.

The *Peaches* which I most covet, are the *Nutmeg-Peaches*, for the sake of their early ripening, the *Common-Minion*, *Milets-Minion*, the *White-Magdalen*, the *Old-Newington*, *Belgard*, the *Admirable*, and the *Catherine-Peach*, which comes late, and is a certain Bearer. Of *Nectarines*, the *Red-Roman*, and *Orange-Tawny Nectarine*. *Abricots*, the *Masculine*, or *Forward-Abricot*, the *Orange* and the *Turky-Abricots* for Walls; and for Standards, the true *Bruxelles*. *Plums*, the *Morocco*, *Imperial*, *Orleans*, *Muscle*, the two *Perdrigons*, *Queen-Mother*, *Violet*, *Abricot*, *Damascene*, *Cloath of Gold*, or *Drap d'Or*, *Royal*, *Bonum Magnum*, and the *White-Pear-Plum*; to which we might also add the *Damson*, which in my Opinion is not without its good Qualities.

Cherries; the *Early* or *May-Cherry*; the *May-Duke*; the *Black*, *Red*, and *White-Heart-Cherries*; the *Carnation*, the *Morella*, the *Flemish-Cherry*, and the *Common-Black*;
and

and also the *Cluster-Cherry*, well enough deserves a Place in our Gardens for the Curiosity of its Fruit.

There has been several ways practised to forward the ripening of Fruit: The late Marquis of *Wharton* had a Glass-Case made on purpose for that End; and by the Help of Fire, against the Back of the Wall the Trees were nailed to, and under the Roots of the Trees, had several Kinds of Fruit very early. But of all the Inventions that I have yet seen, or heard of, the Contrivance of the Ingenious Mr. *John Millet*, Nursery-Man at *North-End*, near *Fulham*, is to be preferr'd: I have seen in his Garden ripe *Cherries* in *February*; and *Abricots*, *Roses*, and *Junquils*, above three Months before their natural Season, and those not in small Quantities, but in as great Abundance as if they had been the Product of Nature alone; and this he does with the Assistance of Horse-Dung, judging it to yield a more gentle Sweating Heat than Fire, and is therefore more natural to Plants.





C H A P. IV.

Of the GOOSBERRY, CURRANT,
STRAWBERRY, RASBERRY, BER-
BERRY, and PHILBUD.

ALTHO' the Fruits, which I de-
sign to treat of in this Chapter,
are so commonly known, that
there is hardly any Garden with-
out 'em ; yet I am apt to believe, the right
Method of Raifing and Ordering them is not
every where understood.

Of the *Goosberry* we have the following
Kinds, which are chiefly worth our Notice,
viz. the large *White-Dutch-Goosberry*, which
produces an excellent Fruit for eating ; the
large *Amber-Goosberry*, which I think is bet-
ter for Baking while they are Green, than to
be kept 'till they are ripe ; the *Walnut-*
Goosberry, which exceeds all others for the
Largeness of its Fruit, which may be gather'd
for Baking sooner than any other ; and the
Champain-Goosberry, which is ripe at least a
Fortnight before any of the rest ; and besides
these, the *Black Hairy-Goosberry* is pleasant
enough. If I should here enumerate all the
other Sorts I have seen, it would be to little

purpose, seeing every Year is likely to produce new Varieties from Seeds; and the Rules for the Culture of any one Sort will suffice for the rest that are, or can be rais'd.

This Kind of Shrub may be propagated either by Seeds, Suckers, or Cuttings; the first may be sown as soon as they are ripe, and will come up the Spring following: The Suckers should be taken from about the Roots of old Trees when their Leaves are fallen, in open Weather, and transplanted in Nurseries; and the Cuttings likewise will take Root, if they are planted in *September* or *October*. These Plants require a strong holding Soil, and may be transplanted in *October* with more Safety than in the Spring.

We have three Sorts of *Currants* very different from each other, viz. the *Large White Dutch-Currant*, the *Dutch Red-Currant*, and the *Black-Currant*: The first is an admirable Bearer, and will sometimes produce Fruit as big as some sort of *Grapes*, but I think are not so pleasant to the Taste as the *Red-Currants*. The Kind which bears the Black Fruit, for Variety sake, as well as on Account of its great Vertue in Medicine, should not be wanting in a Garden, tho' scarce one in twenty can like its Flavour: These may be propagated like the *Goosberry*, and delight in the same kind of Soil. I have known a curious Man, when the Fruit has been just ripe, tie up some of the

the *Red Currant*-Bushes in Mats, to preserve the Fruit upon them 'till *August* or *September*, and sometimes later in the Year, and it is practised by some to plant them against Walls to make the Fruit come larger; but I have never found them half so sweet as the Standards.

Both the *Goosberry* and *Currant* ought to be kept free from old Wood, never leaving on the Plants any Shoots (if possible) that exceeds three Years Growth; for the largest Fruit is always found upon the youngest Branches: These Fruits are ripe in *July*.

We have three sorts of *Strawberrys*; the *Scarlet*, the *Hautboy*, or *Great White-Strawberry*, and the *Wood-Strawberry*: The first is ripe much sooner than either of the other, especially if it has had the Benefit of a good Exposure, and a light Soil, which always contributes to quicken Vegetation; however *Strawberries* delight not in any Ground so much as that which inclines to Clay: 'Tis in such Land we can only expect their Fruit to be large, and in abundance; witness the great Profits which the Gardeners about *HammerSmith* (where the Soil is proper for making of Bricks) draw yearly from their Plantations of this sort of Fruit.

The *Great White-Strawberry* ripens next after the *Scarlet*; and last of all the *Wood-Strawberries*, which continue a long while, but

but chiefly if they be kept shaded after they begin to ripen.

As I know no place where *Strawberries* are so generally propagated as about *Hammer-smith*, so I shall prescribe the same Rules for their Management, as are commonly practised by the Gardeners of that Place.

They provide a parcel of Horse-Dung and Cole-Ashes, well mix'd and incorporated together, and lay on a sufficient Quantity of it upon their Land, to be dug or trench'd in *February*; then they lay up their Borders three Foot wide, and thereon plant the Slips, of whatever kind they see convenient, at about eight Inches apart; after which they set *Beans* for a Crop that Summer; for the *Strawberry-Plants* will not begin to bear Fruit to any purpose 'till the Year following, and even then not comparable to what they will produce the Year afterward, which is the third Year after Planting; 'tis then they have a full Crop, if extraordinary Drought does not hinder: But I should have also added, after the laying up of the Beds, that at every five or six Foot distance, they plant *Roses*, *Gooseberries*, *Currants*, or *Sweet-Brier*, which turns to good Account at the Markets, besides the Advantage of the Shade those Plants give the *Strawberries*.

From a Piece of Ground thus planted, it is hardly to be imagined what Advantage arises to the Gardeners, if they are diligent
to

to keep their Crop weeded, and well water'd, if the Season of their Blossom be dry.

Early in the Spring they clean them, and fling Earth among them to strengthen their Roots; and that the Ground may not lie too long idle, they plant *Savoy's* and *Cabages* in the Alleys for the Winter. A Piece of *Scarlet Strawberries*, so ordered, will remain tolerable good for about Five or Six Years, but the *Hauboy* and *Wood Kinds*, should be renewed once in three Years, always minding to get the *Wood-Strawberries* fresh from the Woods, and not make use of Slips from the Garden, for those degenerate.

But there yet remains many Particulars relating to *Strawberries*, which are not practised by these Gardeners, as the stringing them, or pulling off their Runners in *July*, where the Roots are weak especially, so as to leave all the Plants single, which is practised by some to make the Fruit large.

Again, to make them bear Fruit in the *Autumn*, cut down the Leaves and Flower Stems just before the Blossoms open, and they will shoot out fresh, and bear ripe Fruit about *September*, as I have experienced.

Now if it is desired to have ripe *Strawberries* in *March*, it may be done by Planting some strong Roots in Pots, and putting them on a gentle hot Bed in *January*, giving them what Air may be convenient till they Blossom, and moderate Waterings at
E that

that time with Water a little warm'd: By these Instructions, and the Care of an ingenious Gardener, who will rightly defend them from Frosts, or too sharp Winds, we may have them produce Fruit as I propose. I cannot conclude the Culture of this Plant, without mentioning, that I have made Plantations of them in *April* and *May* with good Success; and the 2d *June* afterwards I have gather'd very good Fruit from them.

The *Raspberry* is the next to be consider'd: We have two Sorts of them, the *Red* and the *White*; the latter is the greater Rarity, but in my Opinion it is not of so good a Flavour as the *Red*: These delight in such Soil as agrees best with *Strawberries*, and are propagated by Slips taken from the Roots in *March*, for that is the best Season to plant them in: Some Gardeners plant single Lines of them, leaving the Distance of about a Foot between the Plants; others make Beds for them of three Foot wide, and plant three Rows in a Bed, both which Ways I find to succeed very well: The first *Summer* after Planting they will fling up some Suckers from the Roots, and put out some few Shoots from the old Stems that were left remaining when they were planted; but as those Stems are never left above a Foot long when we plant them out, we cannot expect any Quantity of Fruit from them the first Year, nor indeed any vigorous Shoots from the Roots till

till the second Year, so that it will be the third *Summer* after Planting before we must expect a full Crop, for the Fruit is always found upon the Shoots of the preceeding Year. The chief Culture necessary for this Kind of Plant, is to keep them clean from Weeds in the *Spring*, and prune the Tops of the strongest Shoots of the last Year to leave them about three Foot high; and that Work must be done in *March*; as also to cut away all dead and weak Branches. The *Rasberry* ripens in the beginning of *July*, and lasts till the End of the Month.

The *Berberry* is a pleasant Shrub, bearing beautiful Branches of yellow Flowers in the *Spring*, and no less delightful Clusters of red Berries towards the *Autumn*: the Fruit is of a sharp Taste when it is ripe, and seldom used any other way than in Sauces: I have been told, that the Leaves of the *Berberry*, when they are young and tender, may be dry'd to imitate the *Indian-Tea*, which they call *Bo-bee*, and indeed the Figure of the *Berberry*-Leaf is not unlike it. If any one of my Readers shall think it worth his while to make a Trial, he may do it after the following manner: Lay the Leaves fresh gather'd upon a Sieve, placed over a Vessel of boiling Water till the Steam has softned them; then spread them upon a Copper-Plate over a Gentle Fire, and move them too and fro till they roll up, which is the Method they

use for drying their *Tea* in *China*, as I have heard ; but I would advise such as intend to make the Experiment, not to be over hasty in drinking the Infusion of such Leaves, before some Skilful Physician has first given his Advice. There are two Kinds of this Fruit, one without Seeds, and the other with Seeds ; the first is so rare, that I have yet only seen it grow in the Gardens of my worthy Friend *Samuel Reynardson*, Esquire, at *Hillington*, among his numerous Collection of curious Plants ; but the other is found frequent enough in most Gardens ; the Plant loves a Loamy Soil, and is increased easily by Suckers from the Root, or Layers in the beginning of *March*.

The *Philbud* is order'd like the *Hazel*, mention'd in the first Part of this Treatise, but is allow'd place in our Gardens, on account of its thin Shell, which is the only Excellency it has more than the common *Hazel*, in my Opinion. This and the *Berberry* should be planted in the most remote Parts of the *Kitchen Garden*.

CHAP. V.

Of BLIGHTS.

AS a *Blight* is the most common and dangerous Distemper that *Plants* are subject to, so I shall endeavour to explain by what Means *Vegetables* are affected by it; and if I shall be so happy from the Observations I have made, to discover the Cause of it, the Remedy may be then more easily found out, and the Gardener will with more certainty hope for Success from his Care and Labour.

I shall be the more particular in discouraging upon this Subject, as it will afford me an Opportunity of opening to the View of my Reader a wonderful Scene of Nature, which hitherto has been slightly touch'd upon by Writers, or overlook'd, or despis'd by unthinking Men; and shall endeavour from the whole to draw such Consequences as may be both profitable and delightful.

Plants of all Degrees are subject to *Blights*, which are so variously communicated to them, that sometimes a whole Tree will perish by that Distemper; now and then a few Leaves

or Blossoms only, and perhaps a Branch or two will be shrivel'd or scorch'd by it, and the rest remain green and flourishing. I have yet never observ'd this Disease to happen among *Plants*, but upon the blowing of sharp and clear *Easterly Winds*, which are most frequent in *England* about *March*; but sometimes happen in other Months. It is very observable, that the *Caterpillars* generally attend these Winds, chiefly Infecting some one Sort of Tree more than another, and even then not every where upon the Kind of Tree they attack, but some particular Branches only, from which Observations I think we may draw the following Inferences, either that the Eggs of those *Insects* are brought to us by the *Easterly Winds*; or that the Temperature of the Air, when the *Easterly Winds* blow, is necessary to hatch those Creatures, supposing their Eggs were already lay'd upon those infected Parts of the Trees the preceeding Year.

The *Blight*s, which are attended with large *Worms* or *Caterpillars*, seem to be rather hatch'd with the *East Wind*, than that the Eggs of those Creatures are brought along it; but those *Blight*s which produce only those small *Insects* which occasion the curling of the Leaves of Trees, may proceed from Swarms of them, either hatch'd or in the Egg, which are brought with the Wind,

Some

Some perhaps may object, that the *East Wind* is too cold to hatch these Creatures, how comes it then that we find them hatch'd when those Winds reign ; or is it reasonable to conjecture, that the same degree of Heat is necessary to enliven an *Insect*, as is requir'd to hatch the Egg of a Pullet. The *Insects* of *Norway*, *Iceland*, and such like cold Climes, must certainly have less Heat to produce them, than Creatures of the same Race must necessarily have in those Climates which lie nearer to the *Sun*. Every Creature without doubt requires a different Period of Heat or Cold to enliven it, and put it in Motion, which is prov'd by so many known Instances, that I conceive there is no room for any dispute upon that Score.

But there may yet be another Question, *viz.* Whether it is not the *East Wind* of it self that blights, without the help of *Insects*, but that may be easily solv'd on my Side ; for that if it was the Wind alone that blighted, then every *Plant* in its way must unavoidably be infected with its Poison ; whereas we find the contrary, only a single Branch it may be, or some other distinct Parts of *Plants*.

And again, to shew how reasonably we may conjecture that 'tis *Insects* which thus infect the Trees, let us only consider, that every *Insect* has its proper *Plant*, or Tribe of *Plants*, which it naturally requires for its Nourishment, and will feed upon no other

Kind whatsoever : Therefore it is no wonder to see one particular sort of Tree blighted, when all others escape ; as for Example, that Wind which brings or hatches the *Caterpillars* upon the *Apple-Trees*, will not any way infect the *Pear*, *Plum*, or *Cherry* with *Blights*, because were the Shoals of *Insects* natural to the *Apple*, to light only upon those other Trees mention'd, they would then want their proper Matrix to hatch in ; or if they were hatch'd already, they would perish for want of their natural Food ; so that 'tis morally impossible that all sorts of Trees should be blighted at the same time, unless the Eggs of every Kind of *Insect*, natural to each Tree, could be brought at one time with the Wind, or that an *Easterly Wind* could contain in it at once as many differing Periods of Cold or Heat, as would be requir'd to hatch and maintain each differing Kind of those Creatures.

The common People in the Country seem to be of my Opinion, that *Blights* are brought by the *Easⁿ Winds*, which they are so well satisfied brings or hatches the *Caterpillar*, that to prevent the too great Progress of *Blights*, it is common for them when the *East-Winds* blow, to provide large Heaps of Weeds, Chaff, and other combustible Matter on the Wind Side of their Orchards, and set them on Fire, that the Smoak may poison either the *Insects* or their Eggs, as they are pass'd along. By this Contrivance I have often known large
Orchards

Orchards preserv'd, when the neighbouring Parts have suffer'd to the Loss of all their Fruit.

And I have also seen these Fires made with good Success to destroy the *Caterpillars* even after they were hatch'd, and had began to devour the Trees, by suffocating them, and forcing them to drop to the Ground, where they have been swept up in large Quantities and kill'd. I have heard it affirm'd, by a Gentleman of Reputation, that *Pepper-Dust*, being powder'd upon the *Blossoms* of any Tree, will preserve them from *Blight*s, which may be because *Pepper* is said to be present Death to every Creature but to Mankind. Now altho' this last Secret is too costly for common Use, yet it may be of Service in some particular place for the Tryal of a new Tree, where a Taste of the Fruit is desired, and besides it helps to inform us, that *Blight*s are occasion'd by Insects, or their Eggs, lodging upon a Plant, and that *Pepper-Dust* will not suffer them either to live, or to be hatch'd.

Another Remark (which to me is Demonstration) that *Blight*s proceed from Insects, or their Eggs (being brought with the *Easterly-Winds*) was the total Destruction of the *Turneps* last Winter, on the West Side of London; about October we had dry *Easterly-Winds* for a Week or ten Days, and several thousand Acres of *Turneps*, which were

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were

were then well grown, turn'd yellow and decay'd, unless in such Places only as were shelter'd by Hedges, Houses or Trees, where they remain'd green 'till the *Insects*, which came with the Wind in about a Week's time, destroy'd those also. Some Farmers imagin'd that the Birds which were there in great Flocks, had eaten the Leaves of their *Turneps*, and contriv'd all Means possible to destroy them, 'till I convinc'd them that the Birds were rather Friends than Enemies, and came there to feed upon the *Caterpillars*, which were in such great Numbers, that each *Turnip-Plant* had not less than a thousand upon it; and that *Insects* frequently pass in Clouds and numberless Armies after this manner; is plain from several Instances, which have happen'd in my Time, and one of them the last *Summer* (I think in *June*) one of these swarms passing over *London* were suffocated, (I suppose) with the Smoak of the *Sea-Cole*, and drop'd down in the Streets, insomuch that a square Court belonging to the *Royal-Society* was almost cover'd with them; these were of the *Fly Kind*, and fully perfected.

It may be ask'd perhaps how these *Insects* came to destroy the *Turneps* only, and not touch the other *Greens* of the *Fields*, as *Cabages*, *Carrots*, *Parsnips*, and the like; every Herb has its peculiar *Insect*, like the *Trees* I have mention'd: Nay more than
this

this, the *Insects* which Nature has design'd to prey upon the *Flower* of a *Plant*, will not eat the *Leaves*, or any other Part of the same *Plant*. The *Leaves* of *Plants* have their *Insects* natural to them, the *Bark* and *Wood*, likewise have their respective Devourers; and those several *Insects* have other Kinds, which lay their Eggs, and feed upon them.

The Flowers of the *Province-Rose*, before they are open, produce and nourish the Insect, in Figure 1 of the first Plate, after the Eggs have been laid upon them. A. Is the *Nympha* or *Caterpillar*, which feeds upon the *Rose-Buds*. B. The *Aurelia* of the same, which for a Time lyes as it were in a State of Death, fasten'd with fine Silken Threads to the Leaves of the *Rose-Tree*, and at length resuscitates and comes forth with Wings adorn'd with curious Variegations of Black and Yellow, C, and eats no more; while it lives in this last State, it seems to be the most perfect, by laying then its Eggs upon the Bark of the same Tree (about 100 in Number) after it has coupled with a Male of its own Tribe. This Process from the Egg to the Fly, is by my Curious and Learned Friend Mr. *James Petiver*, F. R. S. made an Emblem of the Resurrection; the *Nympha*, he observes feeds and grows to a certain Degree of Perfection, as all Animals do; then for a Time is laid up without Motion in a State of Death, and appears at last

last in its utmost Perfection, with Wings beautifully adorn'd with pompous Colours, and breaths only the purer Parts of the Air.

The Leaves of Plants have also their Insects. The *Silk-worm*, for Example, upon the *Mulberry*, the *Common White-Butterfly* upon the *Cabbage* and *Plants* of the same Tribe: And the *Bark* and *Wood* of Trees have also several Kinds of *Beetles*, which prey upon them, and are large enough to be discern'd without a *Microscope*. There are yet other Kinds which are naturally dispos'd to feed upon the Fruit of Trees, such as we often find in *Apples*, *Pears*, and *Nuts*; and the Roots of Trees are also the proper Food for *Worms* of a different Race from those already mentioned, such as are long, scaly, and have many Feet; by some call'd *Canker-Worms*, which by devouring the Roots of Trees, cause them to languish for a Time, and at length die; and the very Pith of Plants is not safe from Enemies of this sort; how often are the *Carnations* and other Flowers destroy'd by little Worms which eat their Pith.

And all these, if I mistake not, have their *Ichneumon Flies*, which feed upon them, and by the help of fine *Tubes* growing about them, convey their Eggs into the Bodies of the *Nymphæ* or *Caterpillars*, where they hatch as soon as the *Caterpillars* are laid up in *Aurelia*, and feed upon them 'till they are
 them-

themselves perfected, and make their Way into the World ; this I am sure of in many Cases, as I have often seen, when that Excellent Lady, the late Curious Dutchess of *Beaufort* diverted her self with enquiring into the Nature of Insects, that the *Aurelia* of several Months have brought only *Ichneumon Flies* of different Kinds : See Fig. II. Plate I. N^o 1, 2, 3. The First is the *Ichneumon Fly*, bred upon the small green *Caterpillar* which feeds upon the Red *Sallow* : The Second feeds upon that bred upon *Burage* ; and the Third feeds upon the Insect commonly found upon *Campion* or *Cockle* ; and it may be these Insects which prey upon others, are not without some others of lesser Rank to feed upon them likewise, and so to Infinity, for that there are Beings subsisting, which are not commonly visible, may be easily demonstrated, if there is any truth in a *Microscope*.

The last *Winter*, during the most severe cold Weather, a Friend of mine was desirous to look into my *Microscope*, and was so impatient that he would not allow me time enough to provide any new Subjects for the *Glasses*, but contented himself with examining some minute Parts of Plants, which had lain between the small *Glasses* for above fourteen Months ; among them he happen'd to pitch upon a small *Hair* of the *Leaf* of the common *Moufe-Ear*, when on a suddain he discover'd

cover'd a living Creature of the Figure of a *Beetle*, in appearance an Inch in Length, walking between the *Glasses* : He was much surpriz'd to find it so perfect in all its Parts, and gave me the *Glasses* that I might observe it, and deliniate it for him, which I did, and by Computation found it to be more than one thousand Times less than the least Dust of Sand visible to the naked Eye. I was then willing to try whether the Cold, which was severely felt by us, was not to that minute Creature equal to the Degree of Warmth, which hatches other Insects of larger Size, and for that End I held the *Glass* about a Yard distance from a slow Fire, about the tenth Part of a Minute, that trifling Heat to us, was so intense to it, that in that short space of Time, it was thereby burnt to Death, and shrivel'd to a fourth Part of its former Size, and scorch'd out of Shape ; this brought to my mind the *Insect* Mr. Ray mentions, which is hatch'd and dies in a Day, and also the several Periods of Life appointed to the several visible Creatures upon Earth ; and I could not help reflecting at the same time, that as I found, by the help of a *Microscope*, that Quantity was only computed to be great or little in Proportion to what Objects our Eyes are capable of seeing without the help of *Glasses* ; so I also imagined that Space was confin'd to our Understanding by the same Rule ; and that the
Life

Life of that Creature, which lives only one Day, is of the same Length or Duration to it in Proportion to itself, as the Term of 100 Years is to Mankind; that is, about three Minutes of that *Insect's* Life is equal to a Year with us; and the coldest Air of the last *Winter*, to the *Insects* I saw, was equal with the *Summer's* Warmth to such Animals as then only come abroad: For the Heat, which kill'd this *Insect*, and was as a violent Fire to it, was hardly warm enough to be discern'd by me.

It is wonderful to consider the Fineness of the several Parts of a Creature even so minute as this (for the *Microscope* has discover'd much smaller) how small must the Organs of its Sences be in Proportion to its Body! The Eyes, perhaps, a thousand Times less, and the other Parts answerable to them; may we then not reasonably conclude, that with such Eyes it is capable of discerning other Bodies, which are as minute, and of as distant smallness to its self, as the smallest Creature capable of our Sight is to us; for I think it is plain, that every Animal, as their Eyes are greater or smaller, or of different Make, have certain Bounds of Sight, beyond which they cannot see without help, such as the *Microscope*, *Telescope*, &c.

But alas! How trifling an Object was the *Insect* I have mention'd in Comparison to those

those discover'd by Mr. *Lewenboeck*, in a Quantity of *Pepper-Water*, no bigger than a Grain of *Millet*, in which he affirms to have seen above 10000 living Creatures, and some of his Friends at the same time witness to have seen 30000, and others above 45000 Creatures moving in that small Quantity of Water. Nay, they tell us, that because they would be within compass, they only related half the Number that they believ'd they had seen.

Now from the greatest of the Numbers mention'd it is inferr'd, that in full a Drop of Water there will be 8280000 of these *Animacula*, which if their Smalness comes to be compar'd, a Grain of Sand broken into 8000000 of equal Parts, one of those Parts would not exceed the Bigness of one of these *Insects*.

These Observations of Mr. *Lewenboeck*, were not only confirm'd by the Famous Mr. *Hook*, but were likewise improv'd by him: He tells us, that after he had discover'd vast Multitudes of those *Animacula* describ'd by M. *Lewenboeck*, he made use of other Lights and Glasses, and magnified them to a very considerable Bigness, and that among them he discover'd many other Sorts much smaller than those he first saw, some of which were so very minute, that Millions of Millions of them might be contain'd in one Drop of Water.

This

This indeed might exceed the Belief of those who are not conversant with good *Microscopes* ; but I am satisfied, whoever once understands their Use, and make Trial of those made in our own Country by the late Mr. *Mellen*, or those of Mr. *Wilson* and Mr. *Marshall*, will not want any Argument to convince them of the Truth of what is here related.

If then it is true, that there are Creatures of that exquisite Smallness here mention'd, and that those Creatures have Life and Motion, as it is evident they have, what must we then think of their Muscles and other Parts, as Mr. *Hook* observes ? Certain it is (*says he*) that the Mechanism by which Nature performs the Muscular Motion is exceeding small and curious ; and to the Performance of every Muscular Motion in large *Animals*, there are not fewer distinct Parts concern'd, than many Millions of Millions, which are visible thro' a *Microscope*.

Mr. *Lewenboeck* has lately inform'd us, that upon a nice Examination of the *Ant*, he finds, that it is not wanting of any Part which is judged to be necessary and conducive to the Life and Motion of the largest *Animals* ; and he further adds, that the Filaments or little Threads which compose those several Parts of the *Ant*, are as large as those which do the same Office in an *Ox*, or any Creature of the largest Size, some-

what like *Silk*, which when it is first spun by the Worm, is all of one Fineness, but may be wove into the broadest *Satin*, as well as serve to compose the narrowest *Ribbon*; the one, only taking a larger Quantity of those fine Parts than the other. And indeed, so far as I have observ'd, it is the same in *Plants*, the *Oak*, the *Gourd*, and the meanest *Moss*, are compos'd of Principles of the same Fineness.

This Account may suffice to shew us, that there are Beings subsisting, which are not commonly visible, and therefore it is easie to conceive, that the most gentle Air is capable of blowing them from Place to Place, and thro' their extraordinary Lightness it is as readily infer'd, that they may thus be convey'd by the Winds to us from the most remote Quarters of the World, but more-especially from the *North-East* Parts, where the Cold is intense enough to give Life to these small Creatures, and from whence there is not a Sea of a large Extent enough to destroy them while they are passing over it; for it is my Opinion, that the Vapour which naturally arises from the Sea, is much warmer than what generally is evaporated from the Earth, and consequently inconsistent with the Life of those minute Creatures, but chiefly those Vapours, which rise from the main Sea, where the Land or fresh Waters are least prevailing; and therefore, were those

those *Insects* to be blown to us from the *North-West* Parts of *America*, I suppose the length of Sea they must then pass over, would kill them before they came to us, and perhaps is the Reason why the Winds from thence are never known to blast any of our *Trees*, and are always much warmer than the *North-East* Winds, which come over a narrower Sea, which has many Rivers running into it. The *Orange-Tree*, in such particular manner, delights in the warm Air of the Sea, that in the Inland Parts of *Italy* they will perish by the Winter's Cold, if they are not housed; and yet several Degrees more *Northerly*, where they grow near the Sea, they flourish, and defie the most rigorous Season. It is observable, that the main Sea of it self never freezeth (as some say) not even under the *Poles*, but only in such Places where vast Rivers run into it, as in the *Sound*, and in *Hudson's-Bay*, where it is mix'd with fresh Water, the Frost has Power over it. It seems reasonable to believe also, that the Vapour which ariseth from the Sea is destructive to *Insects*, because we find how much the *Salt*, taken from the Sea-Waters, contributes to the Preservation of Bodies from *Putrifaction*, which I think is always attended with *Insects*; and if the common *Salt* of the Sea-Water is so great a Preservative against *Insects* and *Putrifaction*, I see then no Reason why the Vapour arising

from the same Fund of Water, should not partake of the same Virtue.

The Receipt to prevent *Wheat* from being smutty (which is a Blight common to Corn) seems to confirm what I have said; and I think we cannot enough commend that worthy Person (who ever it was) that so frankly communicated it, and so generously publish'd it for the common Good; happy would it be for the Nation, if every one would so generously contribute towards its Welfare.

The Receipt teaches us first to wash the *Wheat* thro' three or four several Waters, stirring it round each time with a large Stick backwards and forwards with great Force, and with a Skimmer each time, take off all the light *Wheat*: When this is done, put your *Wheat* into a Liquor prepar'd in this manner:

Put into a large Tub, which hath a Tap, a sufficient Quantity of Water; then put as much *Salt* into it, as when 'tis well stirr'd about, will make an Egg swim; then add as much more *Salt* as was before, and stir it very well, and to this put two or three Pounds of Allum beaten very fine, and stir it about.

This you are to use as you do your ordinary *Brines*, only you must let your *Wheat* steep thirty or forty Hours, for less signifies nothing; tho' the common Opinion is, that steeping so long kills the *Seed* in the *Wheat*; but Experience teaches the contrary.

You must take your *Wheat* out the Night before you sow it, and sift some slack'd *Lime* on it, which serves only to make it dry enough to sow: 'Tis necessary to add some more *Water* to the *Brine* in a Week or Ten Days Time, as it wastes, and *Salt* proportionable to the *Water*, and about a Pound of *Allum*.

Note, Many Farmers steep their *Wheat* in a *Brine*, yet have Plenty of *Smutty Wheat*, because they don't make their *Brine* strong enough, and take their *Wheat* out too soon.

Note also, Many Farmers have suffer'd greatly by *Smutty Wheat*, especially in a dear Year, when such *Wheat* will not sell for above five or six Shillings a Bushel; whereas that which is free from *Smut*, will sell for ten, eleven, or twelve Shillings; and such *Smutty Wheat* being eaten chiefly by the poorer People, and being unwholesome, occasions Sickness; therefore for the Benefit of the Publick this is printed.

From hence we may learn how much *Salt* contributes to the Destruction of *Insects*, which occasion the *Smut* upon Corn; and it is not unlikely, that such *Smut*, when it happens to be found upon Corn, may cause Sickness to such as eat of it; for I am very apt to believe, that the most Epidemical Distempers Mankind is subject to, proceed from Poisonous *Insects*, which are either eaten unregarded, or are suck'd into the Stomach

mach with the Breath, as that worthy Gentleman Mr. *Balle* so curiously observes, in a Letter I have receiv'd from him relating to infectious Distempers, which I shall annex to this Chapter, as it contains many Observations, which may help to explain and confirm what I shall offer concerning *Blights*.

I have already taken notice, that every distinct Part of a *Plant* has its *Insect*, which is naturally disposed to feed upon it, and those all different from one another, as well in Shape as in Colour. It seems reasonable enough also, that every *Insect*, as it has a different Kind of Food, is of a different Virtue, perhaps partaking not only of the *Plants* they feed upon, but of the Qualities of each distinct Part of those *Plants* which are their Food; for as I have observ'd, that every *Plant* has Channels peculiar to the Conveyance of its several Juices, such as those minute Pipes in the Wood, which admit only the rising Vapour from the Root; and those other larger Passages between the inner Bark and the Wood, by which that Vapour returns when it is condensed into a Water. And again, the different Sizes of those Vessels which make the *Parenchyma* of the several Barks, and respectively receive from the falling Sap such Parts only as they are distinctly made to imbibe, not to mention those other Vessels of different Frame in the Leaves, Flowers, and Fruits of *Plants*, which can only
admit

admit of such Particles of Sap, as they are all separately appointed to receive; I say, from these Observations it appears, that every Part of a Plant has then its distinct Virtue from the rest; and so the *Insects* feeding upon each respective Part, must then be of differing Qualities from one another, and I conceive might be of greater Use in Medicine than the *Plants* themselves, if they were once try'd, as the *Cantharides*, which are *Insects* that I think feed upon the *Rose-Tree*; the *Alkermes*, which are bred upon the *Skrub-Ilex*; and the *Cochineal*, which is an *Insect* lately found in *Carolina* to feed upon the *Indian-Fig*, or *Prickly-Pear*; all which Creatures certainly contain the finest Spirits of the Plants they feed on.

I have often thought that it might be of some Use, if such *Animals* as are commonly bred for the Food or Nourishment of Mankind, were sometimes fed with particular Diet, so to alter the natural Vertue or Quality of their Flesh; and especially, if we were to practise upon such as are frequently used in Medicine. The *Thrushes* in *Italy*, which at one time of the Year feed upon *Myrtle-berries*, have then the Flavour of *Myrtle* in their Flesh, and consequently some of its Vertue at the same Time. So I doubt not but *Snails*, (which differ so much from what I call *Insects*, that they will eat of almost any Plant) may be made to alter their

Vertues, by feeding them upon some particular Sort of *Plant* which we have a Mind to extract any certain Vertue from ; but this I leave to be better consider'd by those whose proper Business it is.

Insects infect *Plants* several ways, besides actually devouring them ; as for Example, the *Peach-Trees*, which so frequently have their Leaves curl'd up in the *Spring*, and are at that time cover'd with a kind of *Honey-Dew*, are then generally attended with great Numbers of *Ants* which resort to them ; but it is not from the *Ants*, as is commonly imagin'd, that this shrivling of the Leaves proceed ; the *Ants* rather help the Tree than injure it ; they come thither to feed upon certain little *Insects* which harbour on the Back of the Leaves, wounding the *Parenchymous* Parts of them, from whence they suck the Juices of the *Plant* ; and by that frequent wounding, causes so many *Escars*, that the Leaves cannot avoid Curling, and becoming Gummy. The *Insects* I mention may be easily discern'd without Glasses, but being magnified with a common *Microscope*, appear as large as the third Figure of the first Plate. *Plum-Trees* are sometimes distemper'd in the same manner with *Insects*, somewhat like those upon the Leaves of the *Peach-Tree*, and the Bark of the tender Shoots of both those Trees is frequently pinch'd by other small *Insects* ; one of which I have

I have cut out of it, and magnified as in the fourth Figure, Plate I. its Back was cover'd with Bristles, which grew the contrary way to those commonly found in other Animals: Besides these, some *Peach-Trees*, and the *Almond-Tree*, have their Leaves frequently blister'd and turn *Red*, without any appearance of *Insects*; but if we examine them with a good *Microscope*, we may easily perceive the *Parenchyma* of them to be fill'd with little white Worms; which according to the Nature of other *Insects*, would in time come to have Wings, and I should have likewise given a Figure of, if I had not mislaid the Designs of them. These *Insects*, thus invading the young Shoots, will certainly destroy the Trees, if they are not carefully prun'd off as soon as they appear, as I constantly do whenever I see 'em: And I am inform'd, from a Person of Honour, that to prevent the Insults of these or any other *Insects*, he has known it practised, to bore a Hole with a small Gimlet sloping downwards thro' the *Bark*, so as to reach the Wood of the Tree, and pouring into it some *Quicksilver*, about half an Ounce, or more, according to the Bigness of the Tree, and stopping it up, the *Insects* then harbouring upon it will infallibly be destroy'd; but if the *Mercury* reach the *Pith*, the Tree will be endanger'd: And I cannot chuse but be of his Opinion,

Opinion, altho' I have not made the Experiment, because I have been Witness of the Effect that *Crude Mercury* has had upon *Worms* in Humane Bodies, which answers to what my Author has said of its Operation upon the like kind of Creatures in Trees : And if then by putting *Mercury* in one part of a Tree, the whole is so affected by it, as to destroy the *Insects* feeding even upon its most remote Parts, I think there will be no Occasion to dispute the Circulation of *Sap* in *Plants* ; but the *Insects*, which prey upon the Juices of the *Oak*, and have their proper Matrices, or Beds for hatching in upon the several Parts of that Tree, yet produce other Effects than what I have hitherto mention'd. The *Oak-Berries*, which we find in *May* and *June* upon the *Leaves*, and sometimes upon the Strings of *Male-Blossoms* or *Catkins*, are occasion'd by a kind of *Fly*, not much unlike a *Flying Ant*, which bites the most spongy or parenchymous Part of the *Leaf*, or the tender Part of the *Catkins*, and lays its Egg in the Wound, which perhaps by vertue of some Juice which the *Insect* leaves at the same time, inclines the wounded Parts of the Tree to grow over the Egg, so as to enclose it intirely, and make it swell 'till it is hatch'd and grown big, and strong enough to eat its way out : I have seen of these *Oak-Berries* as big as large *Peas*, and when they are at their

their full Growth, are sometimes, if they be expos'd to the Sun, of a brownish red Colour.

There is another Kind of *Insect*, which attacks the more rough Part, such as the *Bark* that encloses the Bole near the Root of the *Oak*: The Eggs of this are shut up in a kind of Berry, somewhat less than the former, but of a most beautiful Red Colour; they are commonly to be found in *May*, as I have observed in many Places in *Richmond-Park*. Besides these, the *Oak-Apples* proceed from other Wounds made by *Insects* of a different kind in the *Bark* of the tender Twigs, in which they lay many Eggs, that turn afterward to Worms, as I have often seen: These which they call *Apples*, no more than the *Oak-Berries*, are Fruits naturally design'd by Nature for the Tree; but in the manner I relate, are produced by Accident, where the several *Insects* happen light.

It would be tiresome to relate all the several Ways that *Plants* are attack'd by *Insects*; and indeed would be needless to do it, if I was capable, seeing that so far as we yet know concerning these things, two or three General Remedies put in use against those Creatures, will suffice to hinder them from making any considerable Progress: The *Matresses of Straw*, which I have already mention'd, are good Guards against the *Easterly Winds*

Winds to shelter *Wall-Fruit*; and a good Fence of *Timber-Trees* to the *East* of our *Orchard* will contribute to preserve our *Standards* from the *Caterpillar*, which if they should happen to come, may be destroy'd by the *Smoak* of *Wet-Straw* or *Weeds*: And in case our *Peach-Trees*, and such like Kinds of Fruit, should be unfortunate enough to be invaded by those small *Insects* I have describ'd, the pruning off those Leaves or Twigs, as I have already hinted, is a sure way to free us from them, as I doubt not would be the Use of *Quick-silver*, as I have directed. In the Time of the *Great Plague* in *London*, it was propounded to have large Quantities of *Onions* expos'd in Boats upon the *Thames*, which was to have been continually bruis'd, chop'd and moved about, which it was imagin'd would abate the Infection, supposing the *Plague* to proceed from innumerable Armies of minute unwholsome *Insects*, which were then floating in the Air, and drawn in with the Breath: If this Proposal could have had the desired Effect, then I think we might, by the same Rule, destroy the *Insects* upon Trees, by washing the Leaves with Water wherein *Onions* had been bruised and steep'd, or by laying some bruis'd *Onions* under our Trees that are the most assaulted by *Insects*.

There remains yet one thing relating to *Insects*, and their Manner of Infecting of
Plants,

Plants, which is so curious, and I believe so little known, that I cannot well avoid mentioning it ; and that is concerning the *Folium-Ambulans*, or *Walking-Leaf* ; two Kinds of it I have delineated, Fig. IV. and V. in the first Plate, from the *Insects* themselves, now in the Cabinets of the excellently Learned Sir *Hans Sloane*, Bart. of that indefatigable and curious Naturalist Mr. *James Petiver*, and in these celebrated Collections of Curiosity in *Holland*, belonging to the Famous Mr. *Vincent* of *Harlem*, and Dr. *Frederic Ruysb* of *Amsterdam*, all of these Gentlemen, shining Ornaments of our *Royal Society*.

Both the wonderful *Insects* I mention are brought us from *Amboyna*, where there are many different Species of them, and as I am inform'd, are produc'd in the following manner : The *Insect*, when it has found its proper Tree of Nourishment, lays its Eggs separately in the Buds of it, which hatches when the Buds begin to shoot ; the *Insect* then is nourish'd by the Juices of the Tree, and grows together with the Leaves 'till all its Body is perfected ; and at the Fall of the Leaf, drops from the Tree with the Leaves growing to its Body like Wings, and then walks about ; this is not common enough with us to be easily believ'd, and what I should not have ventur'd to mention in this Place, if the *Insects* themselves were not to be met with in the curious Cabinets of our own Country.

What

What I account the most curious Point belonging to this Relation is, That the Sap of any Tree should be so naturally adapted to maintain at once both *Vegetable* and *Animal* Life; and by that Means to unite the Parts of two Beings, so distinct from one another as *Plants* and *Animals*, and circulate the same Juices equally in the Vessels of both. Indeed we have Instances enough to shew us how necessary the Juices of *Plants* are to the breeding up of some *Insects*, and even to confirm that some Kinds of *Insects* cannot be brought to live without their Eggs are properly lodg'd in, and entirely envelop'd with some certain Parts of *Plants*, as those *Insects*, for Example, which Nature has allotted for the Leaves of the Oak, and which make the *Oak-Berries*; but that a *Leaf* of a *Plant* should so unite it self with an *Insect*, as to make one distinct living Body, is wonderful.

The Curious Mr. *Vincent*, above-mention'd, once shew'd me the Picture of a Branch of the Tree which the *Insect* Fig. IV. grew upon, in which was painted these strange Creatures of several Sizes, adhering to the Tree in the manner I have related: The Head and small Parts of the Legs were of a light brown Colour; and the Wings and other Parts were of the Colour of the common *Bay-Leaf*; which Colours the *Insect* retains even after it has been dead several Years.

The

The other of this Kind, Fig. V. has Wings of the Figure and Size of the Leaves of the *Spanish Broad-leav'd Mirtle*; but all its Parts, when I saw it, were of a *Feullemort* Colour.

Now as every *Plant* growing upon the Land is subject to be infected by *Insects*, so the *Plants* of the Waters are also annoy'd by living Creatures that prey upon them. All sorts of *Gnats* lay their Eggs upon the Waters; and so soon as they are hatch'd, and possess that Degree of Life answerable to *Caterpillars*, we see them frisking about in the Water for a Time, commonly making their Motions in the Figure of an S. These *Nymphæ*, like Land *Insects*, lay themselves up at their appointed time, and from that State resuffitate and fly away in Groops: These Kinds are bred in stagnated Water about *July*. The *Boat-Flies*, as they call them, and several other kinds of *Water-Insects*, all have their respective Plants to feed on, and breed upon them (so far as I yet find) somewhat after the manner of Land *Insects*; it would take too much time to relate the several Particularities found in some of them, contrary to other living Creatures, or to describe their several various Forms, which would be of little use to my present Purpose; I shall therefore now submit these Observations concerning *Blights* to the Censure of my Reader, and conclude with

with that curious Letter relating to *Plagues* and other *Epidemical Distempers*.



To Mr. BRADLEY, &c.

S I R,

UPON discoursing with You some time since about *Blights* upon *Trees*, you seem'd to be of Opinion that they were the Effect of *Insects* brought in vast Armies by the *Easterly Winds*, and by lodging upon the *Plants* proper for their *Nourishment*, they there produced that *Distemper* which is call'd a *Blight* or *Blast*.

You was then desirous of what Observations I had made concerning *Pestilential Distempers* subject to Mankind, which I believ'd to proceed from the same Cause that produced *Blights*, i. e. from *Insects*; I have therefore, in answer to your Request, endeavour'd to recollect what I have from time to time observ'd relating to that Case.

To pretend to give a natural Reason for *Plagues* or *Pestilences* that happen in the World, may be thought by some to enter too far into the Secrets of the *Almighty*. *Plagues*, as commonly argued, proceeding from, or being the immediate *Finger* of *God*, without the Concurrence of *Nature*; that

that they are sent down from him immediately for the Punishment of sinful Nations, as in several Cases mention'd in *Holy Writ*; and doubtless such Judgments on Criminals, must have often been, and may yet be to the End of the World.

But however the All-wise *God*, it may be said, seldom in any thing acts contrary to those Laws of *Nature* which he has instituted, rarely working by Violence what may be done by natural Means: So that in this Case, setting aside Miracles, and what the *Almighty* can do, if he pleaseth, by his own Power, my Endeavours will be to find out by what natural Means *Providence* may work to bring that terrible Judgment of *Plague* or *Pestilence* upon any Country.

It is the common receiv'd Opinion, that the *Plague* proceeds from an Infection in the Air, and so undoubtedly it does; but then it will be ask'd, why the Air is not all times thus infected?

Some will have it from *Steams* or *Vapours* arising from some *poisonous Minerals* at certain bad Seasons, which being by us taken into our Bodies with the Air, ferments and corrupts the Humours of the Blood, and our most delicate Parts, and at length extinguisheth that Vital Fire in which our Life consists.

But this can hardly be the true Cause, since few *Minerals* have such mortal *Steams* constantly issuing from them; but at some times only, unless it be in the *Grotto del Cane* at *Baia* near *Naples*, and some other Places of the like kind.

This *Grotto* is a Hole dug into a Bank near the *Lake d'Averna*, whose Water is warm, continually bubbling or boiling up; this *Lake* is cover'd with a Green Scum, and never freezes, lying not far from the famous *Sulfo Terra*, where much *Brimstone* is made, and where *Smoke* issues out of the Ground in many places. The Entrance of the *Grotto* is hardly wider than a common Door, and not high enough to admit a tall Man without stooping, growing narrower towards a Point, a few Yards distant from the Mouth; at the bottom 'tis very wet, almost standing Water, with Stones lying in it, and the Sides are also moist about a Foot or two in a strait Line above the bottom, which is as high as the *Steam* rises, and is known by putting in a lighted Torch into the *Grotto*, and lowering it by degrees, 'till the Flame comes below the top of the *Steam*, and then goes out. The Torch thus extinguish'd, the *Smoke* which is then below the *Steam* cannot rise above it, but slowly steals out of the Mouth of the *Grotto*, and then ascending is dispers'd: Nothing will burn in this *Steam*, nor any Creature either of the Land
or

or Water live in it longer than it can hold its Breath ; not even an *Insect*, as I have experienc'd.

I ventur'd to put my Mouth below the Surface of this suffocating *Steam*, and sucking in a little of it, I found it of a very strong Scent, somewhat like *Sal Armoniac* : It seemed to me, after two or three Trials, that 'twas the most like sucking for Breath in a *Vacuum*, it wanted that Substance which we find in common Air, and is so necessary to maintain Life in any Creature.

The common Trial shewn to Strangers, is to tie the Legs of a Dog, and lay him on the Ground where this *Steam* rises, he immediately falls into *Convulsions*, sets his Eyes, and struggles in the same manner as I have seen Creatures do in the *Air-Pump* when the Air is exhausted. The Dog, when he is void of Motion, is quickly drawn out of the *Grotto*, some few Paces to the Side of the *Lake*, and his Nose and Mouth thrust in and rub'd in the Mud and Water, by which means he soon begins to recover, and in a little time is so well, that he returns home with his Master.

The Man who shew'd us the *Grotto*, when he saw that I was going to put my Head into the *Steam*, protested against it ; and when he could not prevail went away ; but I told him, if I suffer'd as the Dog had done, he should make use of the same Remedy, and

recover me in like manner; but I soon satisfied my Curiosity without receiving any Harm.

Somewhat like this, is what I suppose are call'd *Damps* in *Mines* in *Britain* and other Places, which come only at Times, and are not lasting: These *Damps*, when they rise, will not suffer any Light to burn, and soon suffocate the Workmen and kill them, if they are not presently drawn up into the open Air: No other Means has yet been discover'd to recover them after such Accidents, excepting a fresh *Turf* be cut and laid to their Mouths, which perhaps may be for the same reason that the Mud being apply'd to the Nose of the Dog recovers him after he is drawn out of the *Grotto*.

Upon the Town-Walls of *Leghorne*, and in other Places of *Tuscany*, they have Holes made like large *Ovens* for the Preservation of *Corn*; these *Conservatories* are brick'd within side, and coil'd round with *Wisps* or *Cables* of *Straw*: On their Tops, which are level with the Surface of the Earth, are placed large Stones, with a Hole cut in each of them, big enough to admit Men and Baskets to go down. These places, when they are fill'd with *Corn*, are closey stop'd with Stone-Covets, and Earth flung over them; but hither such *Corn* only is brought as is infested with *Weevels* or *Ferments*, beyond the Cure of turning them, when by the Help of this Method all living Creatures in
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it are destroy'd, and the most violent *Ferment* it can be subject to is stop'd, the *Corn* is taken out and return'd to the Magazines. In *Sicily*, *Barbary*, and I think in all other hot Countries, this is the only way made use of to preserve their *Corn* from spoiling by these Accidents, which it is never safe from after it is thrash'd 'till it is used; and I suppose these *Conservatories* would have the same Effect upon all other Seeds or Grain.

'Tis remarkable, that in and about *Genoua*, where vast Quantities of *Corn* are laid up, they have none of these places for curing their distemper'd *Corn*, but are often constrain'd to send it to *Pisa* to be thus brought to it self, there being no Earth near *Genoua* that will produce that Effect.

In my Time one of these *Conservatories* being empty was left open, where some *French-Men* were playing at *Bowls*, and one of the *Bowls* falling into it, one of the Company was let down with Ropes to fetch it up, but he was no sooner down but was suffocated to death; and one of his Companions, who endeavour'd to get him out, was so sensibly touch'd with the noisome Vapour of the Place, that before he could get half way he was forc'd to return; but this was accidental, and I suppose was somewhat like the *Damps* in *Mines*, which I have already taken notice of.

The poisonous *Vapours* I have here mention'd are plainly more destructive to Animal Life than any others that have been known, in that they act much quicker upon the Spirits of Animal Bodies, than those which are said to occasion the *Plague* or other *pestilential Distempers*: And there is this difference likewise between them, that a Body poison'd by the First will not communicate that Poison to another, as People infected by that *Vapour* which causeth the *Plague* are known to do; therefore I think it plain, that the most nauseous *Vapour* of it self will not cause any *Distemper* that is *Epidemical*.

It seems then that the *Plague* proceeds from some other Cause, and that I suppose to be *Insects* of that extraordinary smallness, that they are not to be discern'd by the naked Eyes; they are so light that they float in the *Air*, and so are suck'd in with the Breath. Such *Insects* not being among us commonly, but only when they are either brought to us from some remote Place by the *Wind*, or hatch'd or nourish'd by some Intemperance of *Air*, or from poisonous *Vapours* rising from *Boggs*, *Ponds*, *Ditches*, or some such unwholesome Funds of stagnating Water.

These *Insects* are various, according to the Nature of the Water or Air they are bred in; their Eggs being first lay'd by some flying Animals, which are then hatch'd,
and

and passing through the several Changes common to *Insects*; at length take Wing, and being drawn in with the Breath, may perhaps be either kill'd in our Bodies, and cause a violent Ferment in the *Juices*, or else finding proper Nourishment, they breed in the *Lungs*, *Stomach*, or other Parts within us, and probably may occasion those Biles and Breakings out in the tender Parts of the Body that are call'd *Plague-Sores*.

But these *Insects* are some of them so extremely small, that they are only capable of being discern'd with good *Microscopes*; and when they are wing'd, and so quite perfected, may perhaps in Swarms be carried from one Country to another by the Wind: It is *Insects* of several Kinds and Colours, which causes the Surface of Waters to appear sometimes *Green*, *Red* or *Black*; which last Colour in Water is observ'd by the Herds-Men to poison the Cattle that drink of it; and they say causeth the *Murrain*, which is the *Plague* in Cattle, and is very infectious.

It has been observ'd that *Plagues*, and the most contagious Distempers, have commonly happen'd in those Years when the *Easterly Winds* have more than ordinary prevail'd in the *Spring* and *Summer Seasons*; then the Air comes to be infected, and rarely or never at other times. These *Winds* we see bring *Caterpillars*, and many differing *Insects* and

Flies, which meeting with Places fitly adapted to nourish them, they are there brought to their winged State, which I conceive is the same in the Invisible Animals as in the Visible; nor indeed is any Part of the Earth, or Waters, and it may be the pure Air it self, free from the *Seeds* of Life: Nothing is out of Motion, or can be void of it, setting forth the Glory and Infinite Power and Wisdom of the *Creator*, from whence these infinite Productions proceed; some for one use, some for another: What we call the Bad, are those which at unseasonable times invade by Swarms the Bodies of living Creatures, to whom they are destructive, and causeth the *Murrain*, *Rot*, and such like Mortal Diseases.

Again, that the *Plague* proceeds from living Creatures brought by the *Easterly Winds* seems probable; for that such *Pestilences* are most malignant in the *Summer*, after the *East-Winds* of the Spring have blown, which passing over the greatest Continent of the Earth bring these *Insects* with it; but the contrary Effect has the *West-Winds*, which come to us over the vast *Atlantick Ocean*, attended with great Rains. These last *Winds* cure the *Plague* (it may be) by carrying back the Remainder of those *pestiferous Insects* which yet survive, to the Country from whence they came; and *Frost* and *Snow* likewise stops the Infection perhaps by killing them, or laying them

them to sleep 'till the next Season, when they may be either brought back again by the *Easterly-Winds*, or be enliven'd, or fresh Swarms hatch'd by the Temperature of Air suitable to them.

I have not yet found that any Winds, except the *East-Winds*, such as pass over *Tartary*, bring any Infection with them, nor have I ever heard of *Pestilential Distempers* in any part of the World, unless in such Places only where the *Tartarian Winds* reach; *Tartary* being a Country full of *Woods*, *Boggs* and *Fens*, it seems the most capable of producing these Creatures in abundance, which may be carry'd by the *Wind* to certain Places in search after their Food, as are *Locusts* and some certain *Birds*, which are known to pass from one Country to another.

Diodorus Seculus, in his *Historical Library*, Book XII. p. 286. saith, " The
" *Plague* broke out afresh in *Athens*, when
" they had been but lately freed from that
" *Contagion*: It raged with that Violence,
" that they lost 4000 Foot-Soldiers, and
" 400 Horse; and of others, Freemen and
" Servants, above 10000. And now, be-
" cause the Course of the History may re-
" quire a Declaration of the Causes of this
" violent *Distemper*, it is necessary in this
" place to set them forth.

" Abun-

“ Abundance of Rain had fallen in the
 “ *Winter*, by reason whereof the Earth be-
 “ ing over wet (especially in low and hol-
 “ low Grounds) the Water lay in the
 “ standing Pools, which corrupting and pu-
 “ trifying by the Heat of the *Summer*, thence
 “ proceeded a Mist of gross stinking *Vapour*,
 “ which corrupted the *Air* ; and besides the
 “ Want of good Food much advanced the
 “ Progress of the Disease ; for the Year be-
 “ fore, the *Fruits*, by too much Rain, were
 “ crude and unwholsome.

“ There was likewise a third Cause of
 “ this *Distemper*, which was this : The
 “ *Etesian Winds* (*which I take to be the*
 “ *Maistrali, or North-west Winds*) blew
 “ not this *Summer*, by whose gentle Breezes
 “ the violent Heat of the *Air* was used to be
 “ allay'd at other times ; so that the Heat
 “ being now more excessive, and the *Air* as
 “ it were inflam'd, Mens Bodies wanting
 “ the usual Refreshment, contracted an evil
 “ Habit, from whence arose *Burning Di-*
 “ *stempers* ; and thence it was that many
 “ seized with this Disease cast themselves
 “ into *Pits* and *Wells*.”

I was not in *England* in 1666, when the
Plague raged in *London* ; but I have heard
 from some of those that then were in the
 City, that the *Summer* was so dry, that
 hardly any Rains fell until *November*, which
 Drought must be occasion'd by an unusual Fre-
 quency of *Easterly Winds*.

Ex-

Experience shews us how much *Insects* delight in stinking Places, and that they increase much faster in uncleanly Cities, such as *London* was formerly, than in cleaner Places; but the City of *London* having been for the most part burnt the Year after the *Pestilence*, its Streets were enlarg'd, many Drains were made, and good Laws put in Execution for keeping the City clean, and it has not had any *Plague* ever since.

It is remarkable, that when the *Plague* reign'd in *London*, *Buckler's-bury*, which stood in the very Heart of the City, was free from that *Distemper*; the Reason given for it is, that it was chiefly inhabited by *Druggsters* and *Apothecaries*, the Scent of whose Druggs kept away the *Infection*; which according to my Notion were so unnatural to the pestelential *Insects*, that they were kill'd or driven away by the strong Smell of some sort of Druggs: The Smell of *Rbue*, and the Smoak of *Tobacco*, were prescrib'd as Remedies against the *Infection*, but especially *Tar* and *Pitch-Barrels*; and I have been inform'd by a Person of Credit, that the People of *Lime-House* were not affected by it, nor some of the *Docks*, perhaps for the same Reason; so also the Use of *Sea-Coal* may now be one means to prevent the *Plague* in *London*.

The People of *Legborne* observe, that at the End of every eighteen Years they are subject to

to an *Epidemical Distemper*; which if it be not the *Plague* is hardly to be distinguish'd from it. I was there in two of those Years; the Second was in the Year 1685, and was much worse than the First: It began about the Beginning of *Summer*, with frequent *Easterly-Winds* (such as were not usual) continuing to blow almost without Intermision 'till towards *Winter*; much as *Diodorus Seculus* describes the Year to have been when the Great *Plague* was at *Athens*, we wanted that *Summer* our *Maistrali*, or *North-West Winds*, as we us'd to have, which are the *Trade-Winds* in all the hot Countries of the World following the Course of the *Sun*: About Nine or Ten in the Morning these Winds begin to blow, and last 'till Sun-set, when soon follow the Winds from the Shore, which blow 'till the next Day about Nine, and then the *Trade-Wind* re-takes its Course.

The first *Infection* began in Houses near the Walls of the Town to the Landward, from whence the *East-Wind* blew, and by degrees crept towards the *Sea*; but the *Infection* did not touch such Places which were inhabited by *Merchants* and *Shop-keepers*, who dealt in *Salt* and *pickled Fish*, *Pitch*, *Tar*, and such like Commodities.

To the *Northward* of the Town, towards the *Sea-Shore*, lay very boggy stinking Ground: These *Marshes* commonly about
Autumn

Autumn causes *Agues* and *Feavers*, which may be from vast Swarms of invifible unwholfome *Infects*, which rife from thence at that Season, but of a different *Poison* from thofe which caufe the *Plague*: So the like Places about *Civita Vecchia*, *Scandaroon*, and I may mention the *Iſle* of *Sheppy* like-wiſe, ſeem to cauſe *Agues*. And it is obſervable, that from the Mouth of the River *Magra*, which divides *Tuſcany* from *Liguria*, along the Sea-Coaſt of *Italy*, as far as *Terracina*, is very unhealthy and ſubject to *Agues* and *Peftilential Feavers*, being *Marſhy Ground*.

We may alſo obſerve, that in *Turky*, *Egypt* and *Barbary*, when the *Plague* rages, the *Franks*, the *Engliſh*, &c. are ſeldom infected with it, which ſeems to confirm my Opinion, that this Sickneſs proceeds from *Infects*, who having their certain natural Nouriſhments reſpectively appointed them, do not in thoſe Places infect Strangers, who have differing Ways of eating and living from the Natives, and are of a contrary Nature of Body. It would be well worth enquiry, if the People of thoſe Nations, that were in ſtrange Countries in the Times of *Peftilence*, were alſo free from *Infection*.

King *Charles* the II^d, when he was told of the Sickneſs at *Legborne*, ſaid, it muſt have been occaſion'd by the *New Fortifications* which were then building in thoſe
Marſhy

Marshy Places : And it is very rational to believe, that turning up those unwholesome *Muds*, and exposing them to the *Sun*, did much increase the *Distemper*, by infecting the *Air*, and filling it with greater Supplies of poisonous *Insects*.

I cannot help taking notice likewise of the raging *Distemper* which was among the *Cows* about *London* two Years ago ; it was so violent and infectious, that if *one* had it, all others that came within Scent of her, or even eat where she grazed, was surely infected ; it seized their *Heads*, and was attended with running at the *Nose*, and a very nauseous *Breath*, which kill'd them in three or four Days. The *Herdsmen* would not allow it to be the *Murrain*, nor could give any Account from whence it did proceed, or could find out any Remedy against it ; they only tell us the unusual dry *Summer*, and the continued *East-Winds*, were the occasion of it. This *Distemper* had been for two or three Years before it came to us, in *Lumbardy*, *Holland* and *Hambrough*, to the Loss almost of all their *Cattle*. The *States* of *Holland* caused a *Medicine* to be publish'd for the Good of those who had their *Cattle* thus distemper'd, but having been try'd here, 'twould not cure One in Seven, but rather increased the *Infection* by keeping the distemper'd *Cattle* longer alive (by some Days) than they would have been with-

without it. 'Tis remarkable, that no *Oxen* had this Distemper, but only *Milch-Cows*, which were more tender than the *Males*. The *Herdsmen*, to keep their Cattle from the Infection, let them blood in the Tail, and rubb'd their Noses and Chaps with *Tar*; and when any happen'd to die of it, they were burnt and buried deep under Ground. It began at *Islington*, spreading it self over many Places in *Middlesex* and in *Essex*, but did not reach so far *Westward* from *London* as twenty Miles.

The most general Opinion concerning the Cause of this *Distemper* was, that the *Cattle* were first infected by drinking some unwholsome standing Water, where 'tis probable some poisonous *Insects* were lodged and bred; the *Summer* having been extreamly dry, attended almost constantly with *Easterly Winds*, the Grass almost burnt up, and the Herbs of the Gardens almost destroy'd by *Insects*; but such as they were (unfit for Table use) were given to the *Cattle*. There was likewise so great want of *Water*, that many were forced to drive their *Cows* five or six Miles to it.

The *Electuary*, publish'd upon this Occasion by the *States* of *Holland*, was compos'd of most, if not all, the *Druggs* used in the most serviceable *Medicines* that were made use of against the *Plague* among Men; most of which Ingredients we know to be mortal

to

to *Insects*, as strong-scented Roots and Herbs; but above all, *Aromatick Gums* and *Saps* of *Plants*; as *Rbue*, *Garlick*, *Pitch*, *Tar*, *Frankinsense*, and *Olibanum*; but I believe, before all others, Extractions from the *Cedar*, nothing preserving Bodies from Worms better than that. These Ingredients are much used in *France* and *Italy* to prevent or destroy Infection, by burning them and smoaking such Bodies, Letters, or any other things as are brought from infected Places, after they have made *Quarantine*, and are not suffer'd to come on Shore 'till they have undergone this Operation.

It is not against Experience, that *Insects* can live and increase in Animal Bodies: How often do we find Men, Women and Children troubled with *Worms*? What Varieties of those *Insects* are often voided by them? And how should that be, if they were not either suck'd into the Stomach with the Breath, or taken into it with some unwholsome Food? For they cannot breed in such Bodies from nothing, without either their Eggs or themselves are brought thither by some Accident: For if they were the natural Produce of Animal Bodies, they would then be alike common to all, which we know they are not.

I have been inform'd, that in the Year 1714, when this *Mortality* among the *Cows* was at its height, that towards the End of the

the *Summer* some Farmers bought in fresh Cattle, and turning them into the same Fields, where many *Cows* has died before, they took the Infection and died likewise ; but the following Spring those Fields were void of Infection, and the *Cows* that were put into them did very well ; but what were then put into the *Cow-Houses*, where the sick *Cows* had been the Year before, were seiz'd with the *Distemper* and died ; which seems to inform us, that it was the Effect of *Insects*, which thro' the Warmth of those Stalls were preserv'd from the Severity of the *Winter's* Frosts ; but such as were left in the open Fields, were destroy'd by the Cold. I have heard that a Woman about *Camberwell* cured six in seven of her *Cows*, by giving them once a Week an Infusion of *Rhue* and *Ale-wort*.

But it may be ask'd, why these *infectious Distempers*, subject to *Men*, *Cattle* and *Plants*, are not universal ? And why the *Plague* should not be as well in *India*, *China*, the South Parts of *Africa* and *America*, as in these Parts of the World ? (For I do not find it has ever been in those Places.) This *Query* gives me a further Opportunity to suggest, that *Insects* are the Cause of it, and that they are brought with the *Easterly Winds*. In the first place, so far as I can learn, there is not naturally in *America* any one Kind of *Creature* or *Insect* that is found in any other

Part of the World, and the *Plants* likewise are all different from those of other Countries; also it is the same in *India*, *China*, &c. whose *Products* are quite different from what we find elsewhere. Supposing then that these pestiferous *Insects* are only the Produce of *Tartary*, let us consider to what Parts of the World they may be carry'd from thence with the *Easterly Winds*; and whether *India*, *China*, the South of *Africa* and *America*, are not beyond their reach, or can reasonably be affected by them.

Whoever considers the Disposition of the Land and Water in the Globe, may thus account for the Passage of these *Insects*, with an *Easterly Wind* from *Tartary*, to all the Parts of *Europe*, *Asia-Minor*, *Palestine*, *Barbary*, and other *South Coasts* of the *Mediterranean Sea*, whither, 'tis highly probable, they may come, without meeting any thing in their way to obstruct their Course.

The best Maps do not lay down any *Mountains* of Note between *Tartary* and the places which have been subject to the *Plague*: The *Alps* run parallel with the Winds coming from *Tartary*, and therefore does not any way hinder their Passage: The *Mountains* of *Dalmatia* are not high enough to prevent the Passage; or if they were, the *Caspian Sea* is sufficiently large to let them pass to the *South Parts* of *Europe*, the *Mediterranean*

mean Sea, and the North Coasts of *Africa*, even to their most *Western* Bounds.

Now it may be expected perhaps by some, that these *Winds* should yet continue their Progress as far as *America*; but as yet, so far as I can learn, these *Land Winds*, when they have blown with the greatest force, and have been of the longest continuance, have not reach'd farther than about three hundred Leagues beyond the *Western* Coasts of *Europe*, which is a trifle in comparison of the vast *Ocean* between *Us* and *America*: Besides it is my Opinion, that the *Winds* which blow over so vast a Tract of Land, as these *Tartarian* *Winds* must do, that I suppose convey and support the pestiferous *Insects*, are of so different a Nature from the *Winds* coming from the *Ocean*, that 'tis likely those Creatures which would subsist in the one, would be destroy'd by the other: So that if I am right in this Conjecture, *America* cannot be subject to the *Plague*.

Mount-Atlas, which is a vast Ridge of *Mountains*, running from the *Ocean* almost as far as *Egypt*, and are back'd with the Desarts of *Libia*, may very likely obstruct the Passage of these *Insects* to the *South* of *Africa*; and for that reason perhaps, secure that Part of the World from *Plagues*. So likewise *Mount-Caucasus*, or *Ararat*, which is one of the highest Ridge of *Mountains* in the World, running from *East* to *West*, thro'

Persia and *India*, may secure the *South* Parts of those Countries from the *Plague*, by stopping the Passage of those infectious Creatures, if any *Winds* from *Tartary* should happen to blow them that way: And as *China* lies to the *East* of *Tartary*, so it must be *Westerly Winds* which must infect that Country with the *Plague*, if it proceeds from what I imagine: But we do not yet find that *Westerly Winds* are frequent in those Parts; or if they are, we may be assured they cannot blow at the same time when the *Insects* are hatch'd and carry'd the contrary way by the Wind from *Tartary*. We are inform'd, that upon the Coast of *China* the Winds are so regular, that from *October* to *March* they continually blow from the *North-East*, and from that Month to *October* the direct contrary Way.

I have now given you what Observations I have made concerning pestilential *Distempers*, which I think may, in some measure, serve to confirm your Notion of *Blights*.

I am Your, &c.





OF THE Kitchen Garden.

CHAP. I.

Of the HOT BED.

A *Hot Bed* is the common Help made use of by *Gardeners* to forward the Growth of a *Plant*, and force Vegetation, when the Season of it self is not warm enough. By this means (if it be managed with Skill) the hottest Climate of the World may be so nearly imitated, that Seeds of Plants brought from any Country between the *Tropics* may be made to flourish : In a word, it is both curious and useful.

In order therefore to have a right Understanding of the *Hot Bed*, let us consider what Degree of Heat is required for the Growth of *Plants* we are to raise upon it ; for Nature must be imitated as near as pos-

fible, and not forced or exceeded, if we hope for Success in our Undertaking.

Heat and *Moisture* are certainly the Rudiments of Vegetation; and therefore whoever would promote the Growth of a *Plant* must contrive how to have them both in such due Proportion, as that neither one nor the other exceeds those Limits which Nature has allotted for the Growth of *Plants*. A dry *Heat* we find rather scorches and shrinks a *Plant* than makes it grow; and wet, if it is not quickly exhaled from the Root of a *Plant*, chills it, and often injures it past Recovery. A moderate Sweating *Heat* therefore is the most desirable, such as is rais'd by the Ferment of wet *Straw* or *Horse-Litter*, which for a time will send forth from the Earth lying upon it, that gentle *Steam*, impregnated with Vegetative *Salts*, which we find contributes so much to the Growth of *Plants*, besides the putting those Juices into motion which are lodg'd in the Root, and circulating them thro' the *Vessels* of the *Plant*.

The *Steam* which I suppose to rise from the Root into the *Wood-Vessels* of *Plants* to furnish them with *Sap*, Chap. I. Part I. of this Work, will indeed, of it self, keep a *Plant* alive; but then at the same time the *Bark*, *Leaves*, and other *Spongy Parts* of a *Plant* (which encompasses the *Sap-Vessels*) if they are over dry, will shrink and pinch those

those *Vessels* so very close, that they then cannot admit the *Sap* to circulate thro' them in such Quantity as is necessary to support the Plant in Vigour; on the contrary, when the *parenchymous* or *spongy Parts* of Plants are kept moist by the *ascending Vapours*, which continually rise round about them from the *Earth*, then the *Sap-Vessels* are also more open, and at liberty to receive the Nourishment rising from the Roots.

To explain this, let us consider those Plants which are cultivated in Pots, and set singly in Chambers, and other places of the House for Ornament in the *Summer*; tho' we allow them large *Pots*, fresh *Earth*, and *Water* enough, and *Air*, as much as they have in a *Green-House*; how sensibly do they decline in a few Days, which happens only for want of that *Steam* which is always abroad (more or less) rising from the Earth in the Day, and condensing and falling upon them again at Night.

Nor can the *Pots*, set singly in a Chamber, have this help as those have which are set together for Shelter in the *Winter* in a *Green-House*; the number of *Pots*, in a Collection of *Plants*, affording *Steam* enough to nourish one another, which one single *Pot* must want.

The like is to be observ'd in a dry Season, when we are forced to water Plants that stand abroad; they are by that help but just kept

alive, because the Earth round about them is so dry, that it hardly emits any *Steam*, or at least not enough to support them; but when Rain has failen, we find a contrary Effect; the Vapour then rises from the Earth every where about the *Plants*, and make them flourish: So that I prefer the Floating of Grounds, for the Welfare of many Kinds of *Plants*, before simple Watering; but there are some particular Sorts which it would destroy, as I shall explain elsewhere.

A *Hot Bed* then appears to be of Use so long only as it can send out such *Vapour* from the Earth lying upon it, as is necessary for the Support of the *Plants*; and when it wants the *Heat* which is requir'd for that purpose, it must be renew'd; for else the Moisture, which must be maintain'd to nourish the Roots of the *Plants* growing in it, will chill and destroy them. I would not be supposed here to mean the *Steam* which arises from the *Dung* it self, for that is known to be destructive to all *Plants*; 'tis the *Vapour* only which the *Heat* of the *Dung* evaporates from the Earth lying upon it, which will help the *Plants*, and that too must be temperate and well qualified, lest it scald them, which may be moderated according to our Desire, by laying the Earth upon our *Hot Bed* of a due Thickness, answerable to the *Heat* below it.

Having

Having thus given my Opinion concerning the Qualities requir'd in a *Hot Bed*, I shall in the next place proceed to give proper Directions for making it. The *Dung* of *Horses* or *Asses*, such as is taken fresh out of the Stables or Stalls, is the most proper for our purpose ; it should then be thrown up into a Heap, with a few Sea-Cole Ashes among it, and very well water'd. In this State, if the Quantity be very large, it should lie to heat about eight Days ; but two or three Loads only need not lie above half that time before you use it. The Bed then must be mark'd out somewhat more than three Foot wide, answerable to the Size of your Frames ; the length of it running from *East* to *West*, so that it may face the *Sun*. Some *Gardeners* dig a Trench a Spit deep to make the Beds in ; and others save that Trouble, and make it all above Ground : I have try'd both ways, and find so little difference, that I cannot say which is best : But I think if the Ground be wet and springy, it is most reasonably to make the *Bed* quite above Ground, least the *Dung* be chill'd. In the spreading of the *Dung*, we must chiefly have regard to lay it equal in every Part, that when the *Bed* comes to settle, it may not lie uneven ; and besides, that it may heat altogether : The whole must be trodden down from time to time, as fresh Litter is laid upon it, 'till at length the *Bed*

is

is of the Substance you desire, which ought to be (in *Winter*) about three Foot high.

Having thus prepared your *Bed*, set on your Frames, and put the Earth you design for it upon the Dung, laying it ridge-wise, that it may be more conveniently turn'd over as as you see occasion, if the *Bed* should burn. When you find the extream *Heat* begins to abate, level the Earth upon it, to sow what Seeds you design; minding always to have upon your *Bed* five or six Inches thick of Earth to prevent the extream *Heat* of the *Dung* from spoiling your Crop; and that the Roots of whatever you sow or plant, may always keep free from the *Dung*, which whether it be hot or cold spoils most Plants that touch it. In short, to see the working of two or three *Beds*, if a Man is careful to make Observation of them, will better inform him than any written Directions; for some *Beds* will heat sooner than others. And again, I have known one *Bed* out-last three in its *Heat*, which depends partly upon the Nature of the *Dung* it is made of, and also in the true Method of working it. The Frames which cover these *Beds* likewise, contribute greatly to the maintaining the *Heat* in them. A large Frame requires a greater *Heat* to warm the *Air* it encloses than a small one: So if two *Beds* were made equally (as possible) of the same Strength; the one cover'd with
a large

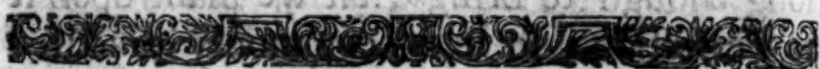
a large Frame, and the other with a less; that with the large Frame would sooner cool than the other, and perhaps preserve a *Plant*, when those under a smaller Frame would burn: And the too frequent opening of a *Bed* likewise contributes to cool it much sooner than it would otherwise be. In a word, rather desire such *Heat* only in your *Hot Bed*, as will suffice to keep out the Frost, than covet to make your *Plants* grow quick.

But as it is not suppos'd that any *Hot Bed*, without some Help, can maintain its *Heat* long enough to bring what we plant upon it to Perfection; so it is commonly practis'd when it begins to cool, to cut away the Sides of it slope-ways, and laying fresh *Dung* to them, it recovers its lost *Heat*, which is call'd *Backing* or *Lining* of a *Bed*; and this Work the skilful *Gardeners* will repeat sometimes five or six times in a Season, as they see occasion, rather than make fresh *Beds*.

If a sufficient Quantity of *Dung* fresh from the *Stable* cannot be easily compass'd, we yet need not be destitute of a *Hot Bed*; some *Horse-Litter* already cold; *Straw* steep'd in *Pond-Water* two or three Days; *Grass*, *Cole-Asbes*; and if they can be had, the *Grains* of *Malt* after Brewing, or damaged *Bran* made very wet; if they are thrown together in a Heap, and well water'd, will ferment and heat as well as any *Dung* we can desire.

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It remains now only that I give Directions for composing of *Earth* proper for our *Hot Bed*, which should always be light, fresh, and well sifted, considering how tender the *Roots* will be of those things which are to grow in it. Take therefore of fresh sandy *Loam* one half, and add to it an equal Part of *Horse-Dung* well rotted; let these lie in a Heap together well mix'd, to be screen'd or sifted when it is wanted: Rotted *Leaves*, well consum'd, are also good if *Dung* is wanting.



CHAP. II.

Of *MELONS, CUCUMBERS and MUSHROOMS, their Culture.*

HAVING in the foregoing Chapter given the necessary Directions for preparing a *Hot Bed*, I shall now proceed to offer some Observations and Experiments I have made in the Culture of *Cucumbers* and *Melons*: And first concerning the raising the *Plants* for the General or *Summer Crop*, for 'tis that we must depend upon for a Quantity of Fruit. Towards the beginning of *March* is time enough to put in the Seeds of *Melons*, which we design for *Ridge Plants*; those, if the Bed be

be moderately warm, and in good temper, will come up and be fit to plant out four Inches a-part about a Week after sowing, they may thus remain 'till their first Leaf is about the bigness of a Crown-piece; and then when the second or third Joint appears, cut off the prime Leader from each Plant, near the *Ear-Leaves* or *Lobes*, and they will each of them quickly put out three other *Runners*, which will produce Fruit plentifully; and those also are commonly prun'd at every third or fourth Joint when they come to run; this is the common way.

About the latter End of *April*, or the first Week in *May*, the *Melon* Plants, thus rais'd, will be fit to plant upon Ridges, which should be made thus: Cut a Trench about two Foot and half wide, and sixteen Inches deep, in which lay of Horse-Litter, prepar'd as I have directed for the *Hot Bed*, about two Foot thick, which will raise it somewhat above the Surface of the Ground: In this Work take care to spread the Dung equally, and tread it over gently to settle it; then at the distance of about four Foot in the middle Line of the Ridge, make Holes about ten Inches over, and about six Inches deep, and fill them with the prepared Earth: After this cover the whole with the same Soil, about five Inches thick, and make them into flat Beds four Foot wide, for the *Vines* to run upon.

About

About two or three Days after the Ridges are thus prepar'd, plant two *Melon Plants* in each Hole, sprinkling them with Water (that has been warmed in the *Sun*) and covering them with Square or Bell Glasses; immediately upon which, either Mats or Straw should be put to keep the *Plants* from withering by the *Sun's* Heat, 'till they have struck Root; and so likewise should *Cucumber Plants* be ordered, if they are planted out upon Ridges at this time of the Year, but they require no pruning.

About the latter End of *May*, or a Fortnight after planting, they will be in a growing Posture; and then if the *Easterly* dry *Winds* are ceas'd, tilt up the *Glasses* about an Inch in the Heat of the Day, to give them Air for two or three Hours, that by degrees they may be harden'd to the Weather. It is now I cannot help taking notice of two or three things practis'd by the *Gardeners* in the *Culture* of *Melons* and *Cucumbers*; which altho' they may perchance be generally practis'd, yet I am sure they deviate from the Laws of Nature; and Experience has shewn me, that their Work in those Points is needless, and might better be avoided. In the first place, when a *Melon* or *Cucumber-Plant* is in Blossom, it is customary for them to pull off all the false Blossoms, which they say would weaken the Plant; but if those are the Male Flowers, as they seem to be,

be, it is them that are ordained by Nature to set the Fruit, (which I think I have already explain'd.) In the next place it is a common Practice to lay the several Leaders of the *Vines* at equal Distances from one another, and often lift them up to view the young Fruit, which is very hurtful; for that the Vessels which convey the Juices to the Fruit are very tender, and subject to be bruised by the least bending from their Place of natural Growth. But yet more than this; I have seen a Bed of *Melon Plants*, which an Ingenious Professor of *Gardening* has prun'd and laid in order (as he call'd it) with great Dexterity, and had no false *Blossoms* left upon them, that have from time to time offer'd abundance of *Fruit Blossoms*; and by being frequently handled and disturb'd, have not set one Fruit; while on the other Hand two other *Plants* of *Melons*, which were sown later, by a Month or more, and had been disregarded, surpriz'd him with several large Fruit, when he hardly expected to find them in Blossom: And so in the *Vines*, for forward *Cucumbers*, the Fruit that sets first seldom comes to Perfection, because upon all Occasions the *Vine* is taken up to look how it comes forward; but in the most remote Corner of the *Bed*, where the *Plants* are the least regarded, commonly comes the first perfect Fruit. And lastly, I find another Practice too frequent, which

which I account as unreasonable as the others, and that is the exposing a young set Fruit to the *Sun*, by taking away the Leaves from about it. A Gardener of small Experience may know that Fruit of any Sort grows best in the Shade, and that the immediate Heat of the *Sun* is only necessary for the Ripening of Fruit, and not for the Growth of it ; for the *Sun-Beams* falling directly upon a *Plant* dries and pinches the *Vessels* of it ; so that the *Sap* wanting a free Passage, it is impossible it can fill the *Plant* so quickly and plentifully, as it would do if the Parts were larger and more open, such as they are always in the Shade ; and that this is Truth, I appeal to common Experience, whether Fruit growing in the Shade, is not larger than the same Kind growing in the full *Sun*.

In *Spain*, *Portugal*, and the *South* Parts of *France*, the *Melon Gardens* are seldom regarded after they are sown, 'till the Fruit begins to ripen. And I have been inform'd by some Inhabitants of those Places, that they never fail of good and large Fruit in great Quantity, altho' they give them no other Dressing than what is necessary to prepare the Ground for the Reception of the Seeds.

It was the Opinion of some of the Ancients, that Women should not always be suffer'd to come among Plants, for that at certain

certain Periods the very Approach of a Female was pernicious and destructive to them; but that Notion, with many others of the like Nature, have long since been destroy'd by Experience to the contrary, and seems only to have been maintain'd for want of better Judgment.

But now supposing our *Melons* are fully set, we may then count about forty Days to the Time of their ripening, which I think is observ'd as a Rule among most experienc'd *Gardeners*: Give them gentle Waterings, now and then, if the Earth be extream dry; for *Melons* do not delight in abundance of wet, neither will the *Fruit* be well tasted if the *Plants* are kept too moist. But *Cucumbers* love frequent Refreshings of Water, and will not prosper without it. Upon the Setting of a *Melon* it is commonly practis'd, and with good Reason enough, to pinch or prune off the running Branches two Joints above the *Fruit*; so that all the *Sap*, appointed for the Nourishment of that Branch, may be turn'd into the young *Fruit* for its Nourishment. This may contribute to make the *Fruit* large, if it be well guarded with *Leaves* from the scorching Rays of the *Sun*, during the Time of its Growth: But as soon as it is fully compleated, then indeed it cannot well be too much expos'd to the *Sun's* Heat, even to receive it thro' a Glass, which will forward its ripening, as may be

known by the agreeable Odour it will send forth when it is fit for the Table.

For the more certain producing of *Melons* of a right Flavour, let me advise that no *Cucumber Plants* be set near them, least the *Male Dust* of the *Cucumbers* should happen to be carry'd with the *Wind* upon the *Blossoms* of the *Melons*, and perhaps set them for Fruit, which will then certainly give the *Melons*, so produced, the Relish of the *Cucumber* in proportion as the *Farina* happens to fall in greater or lesser quantity. See Part I. Chap. II. Of the Generation of Plants.

During the Growth of the *Vines*, the Earth they run upon should be carefully kept weeded and stir'd gently on the Surface; for the Roots both of *Melons* and *Cucumbers* are tender, and always shoot out in length as far as the Branches reach: But some indeed more than others, are subject to run into *Vine*, and that for two Reasons: First, All Plants, either of *Melons* or *Cucumbers*, as their Fruit is greater or smaller, produce *Vines* of greater Size, or lesser Proportion. I have known *Vines* of large *Melons* that would shoot (if they were left at liberty) about six Foot in a Summer, and the small Sorts have not grown two Foot; and so in *Cucumbers*, one Root of the large *Turkey Kind* has produced as much *Vine* as four or five Roots of the short prickly *Cucumber*, which ought

ought to be consider'd when we plant the Ridges ; one *Plant* of a large Kind, if it thrive, will be enough for one Hole, when perhaps of smaller Sorts, three or four may be necessary for the same purpose. But, 2dly, all fresh *Seeds* of *Melons* and *Cucumbers* will produce much larger *Vines* than those *Seeds* which have been kept several Years. New *Seed* is apt to draw such plenty of Nourishment, that it is seldom prolifick ; for too hasty thriving is ever an Enemy to Breeding or Prolesicity. So on the other hand, when I have sown *Melon* and *Cucumber-Seeds* of seven or eight Years old, the *Vines* have been close jointed, and more subject to produce Fruit.

The *Italians* have a *Melon* which is commonly ripe about *Christmas*, and esteem'd among them as a Rarity ; some of the *Seeds* of it are now in several Gardens in *England* ; but I know not whether every one is acquainted with the right Method of its Management, therefore shall venture to give my Advice concerning the raising and preserving that Rarity of the *Winter* : The *Seeds* should be sown towards the latter End of *April*, or in *May*, in a Bed moderately warm ; and the *Plants*, when they are come up, be so ordered, that the Fruit should not come to its full Growth 'till the latter End of *September*, or middle of *October*, the natural Warmth of the *Summer*, without
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any Art, will be sufficient for that End, 'till the cold Evenings in *August* begin to approach ; then it will be necessary to shelter both the *Plants* and *Fruit* from the *Frosts* and cold *Dews*, 'till you think your *Fruit* will grow no bigger ; and in the Heat of the Day, strip the *Plants* of their *Leaves* ; let the Sun then dry the *Stalks*, and pull them up by the *Roots* to hang up afterward in a *Green-House*, or some such well-exposed place, to dry more thorowly ; after which they may be tied up by the *Stalks* in a dry Room, or laid in Chests of Bran, or very dry Sand, to keep them from the *Winter Air* 'till *Christmas* ; if they are not then ripe enough, wrap them in a Cloth, and lay them in a Horse-Dunghill for about twenty four Hours, which will ferment their *Juices*, and cause Ripeness, as I have heard, and am apt to believe.

But seeing that the Pride of the *Gardeners* about *London* chiefly consists in the Production of *Melons* and *Cucumbers* at times either before or after the natural Season, I shall also prescribe some Rules for the Raising and Cultivating them at those times, which I shall lay down in as plain Terms as possible.

Most of the *Gardeners* I am acquainted with make their *Seed-Bed* for these *Plants* in *January*, altho' sometimes the Ground is cover'd at that time with *Snow* near a Foot thick ;

thick; but I must confess, I shall never follow that Method while I have any regard to the Ways of Nature: For is it reasonable to believe, that young Plants, tender as they must be when they are thus just forced out of the Ground, can be able to withstand the least *Air* from abroad, when *Frosts* and *Blasts* continually reign? And to preserve them without *Air* is as impossible: Therefore to go more reasonably to work, prepare a *Hot Bed* about four Foot square, and two Foot high, in the first Week of *October*, and sow the *Seeds* both of *Melons* and *Cucumbers* in it, when the Heat of it is moderated; a Week after they are come up, plant them four Inches apart on the same *Bed*, after having stir'd the Earth very well: In this Month the Days are commonly warm, and in such Weather they ought to have as much *Air* you can possibly give them; but the Nig as are uncertain, and therefore the *Plants* must then be cover'd up close with the *Glasses* and *Mats* over them. In this first raising of the *Plants*, a skilful *Gardener* may make them as hardy as he pleases; for it is not his Business so much to draw or force them, as to strengthen them against *Winter*.

All *Annuals* are as naturally disposed to live from the Autumn to the Spring, if they are kept from flowing in the *Winter*, as they are commonly known to flourish in the *Summer* Months; and both *Cucumbers* and *Melons*,

lons, which are likewise of the *Annual* Race, might as well be kept the *Winter* as any other *Exotick Annual* whatsoever, if we would not let them blossom before *Christmas*. I have my self kept young *Plants* of *Amaranths*, and of the *Nastertium Indicum*, which I sowed in Autumn, 'till the *Summer* following, only in a common *Green-House*; and I am perswaded *Cucumber Plants* might be preserv'd almost with as little trouble. I am inform'd, that the last Year a *Gardener* sowed some *Cucumber-Seeds* as soon as he had gathered them, and cut Fruit from those *Plants* very early in *January*.

When the *Plants* are in the second Joint, I would advise that they be either planted in small *Garden-Pots*, or *Baskets*, open on their Sides, made with *Oziers*, about ten Inches over the Top, and four Inches deep; so may we more easily remove them without Damage from one Bed to another, as the Severity of the Season may require: But I prefer the *Baskets* rather than the *Pots*; because when the *Plants* begin to run, the *Roots* are at full liberty to find their way into the neighbouring Earth of the Bed they are to stand in, without transplanting, which might endanger them. In one of those *Baskets* may be planted about five or six *Plants*, least any of them should go off; tho' it is reasonable to believe, that a *Plant*, which has had the advantage of a gradual declining Season to harden

harden it self in, will not be so subject to suffer by the Weather, or require so much Heat to maintain it, as those which make their first Appearance in the mids of Frost and Snow. In short, let the Gardener rather endeavour to defend them from the Weather, than to force them; as the Bed cools, let him line the Back and Front of it with fresh Dung; let the Plants receive as much Air and Sun as he can reasonably give them, and guard them well with Straw and Matts in the Night, and there is no doubt but he will have Fruit early enough; but I speak to the Ingenious, who may yet improve what I have said, and not to those who despise Learning because they know little.

I shall now conclude this Section with a Word or two concerning the raising of *Cucumbers* on the Natural Ground for Pickling; for this we have no more to do than chuse a Piece of Ground pretty rich, and well exposed to the Sun; and after having wrought it well with a Spade, make Holes in the Form of Basons, about four Foot distant from each other, and sow the Seeds in them the first Week in *May*, if the Weather be settled; put at least a Dozen Seeds in a Hole, for it is much better to have Plants to fling away, than to want a Crop, which often happens by being too covetous of Seeds.

S E C T. II.

Of MUSHROOMS.

Whoever has been accustomed to eat *Mushrooms*, will certainly allow them to be one of the greatest Dainties the Earth affords, especially the *Morel*, *Truffle*, and *Champignon*; the two first have been found in but few Places in *England*; but I am apt to believe they are as plentiful with us as the other, if they were skilfully sought after; they are to be met with in the Woods; the *Morels* chiefly appear in *April*, and the *Truffle* about that time may be dug out of the Ground, for they never appear above the Earth. Those who make it their Business in Foreign Countries to gather the *Truffles*, have only one way (as I can learn) to find out where they grow, and that is by the help of a Hog, who they lead in a String thro' the Woods, suffering him to root up the Earth as he goes along; for Swine being very voracious of them, discover them by their Smell, and turn them out of the Ground; of these Kinds I have not known any that have been propagated by Art, as the *Champignons* have been, which tho' this last kind is common enough in many Places in *England*, without any Culture, yet it turns to good Account to raise them in our Gardens, since the Trouble of doing it is not considerable, and their Use begins to be known.

known. The true *Champignon* has its Flesh very white, first appearing like a Button, with a Footstalk adhering to it, the Chives within it are of a Flesh Colour, and as the Cap of it explains it self, those Chives become darker by Degrees, and are at length black: I have seen some of the Caps when they have been fully explain'd about six Inches over, and of a considerable Thickness. This kind is the only sort I can recommend for its Goodness among the *Cap-Mushrooms*, and then only when they are fresh and free from Worms, which are apt to breed in them, their Stalks especially, and such are not accounted wholesome. We commonly find this sort growing in rich Pasture-Grounds about the latter end of *July*, or in *August* and *September*, after Rains have fallen.

The Observations I have made concerning the natural Produce of *Mushrooms*, seem to discover that they are produced by some Putrification in the Earth, or in those Bodies they are apt to grow upon; we have not in *England* less than 100 different Kinds that I have observ'd, besides those very minute Sorts that can only be discern'd with the Microscope in the Moldiness of Fruit and Liquors, which last Kinds are so quick of Growth, that in less than twelve Hours time they are perfected; and shedding their Seeds, several Hundreds of the same Kinds immediately vegetate; whence it is that Moldiness so soon

soon overspreads those Bodies it once infects.

The Rings of *Mushrooms*, which are often seen upon Downs, Plains, and Commons, are called by the Country People *Faries Dances*; these are not always of one Sort of *Mushroom*, but various, according to the Soil that produces them. It is observable, that the Grass is always much greener and ranker in the Line where those *Mushrooms* appear, than in other Places of the same Grounds, which I have often wonder'd at, as well as the exact Figure of a Circle they have represented. When I enquired into the Reason of this strange Production, I discover'd two Things worth Observation; the first was, that just under the Turf where the *Mushrooms* were growing, was a Tract or Path made by *Pismires*, which was not only hollow in many Places at that Time, but the very Covering of that Passage was made of Earth extreamly fine, which those Creatures had flung up: The Fineness of the Earth wrought by those laborious Animals might very reasonably contribute to the extraordinary Vegetation of the Grass growing upon it, and the Howness of the Ground underneath might produce that Moldiness within it, which afterwards might be formed into *Mushrooms*; for it has always been my Opinion, that if Earth is made extreamly fine, and by that means the *Salts* of it more at liberty to act, whatever grows upon it will be much more vigorous.

vigorous. Again we find by Experience, that in such places where the Ground lies hollow near the Surface, it always turns musty and moldy.

But 2^{dly}, *Garden-Snails*, the large black *Dew-Snails*, and others without Shells, call'd *Slugs*, when they couple, always make choice of short Grass to creep upon: It is their manner, when they generate, to take a large Compass upon the Ground, and meet one another: Thus I have seen them creep in a Circle for more than half an Hour, going over the same Ground at least twenty times before they could join, leaving upon the Grass where they crept, a viscous shining Matter. So that it may be, that Slime when it putrifies may produce the *Mushrooms* we find growing in Circles upon Commons; and I am the more apt to believe it so, because I have more than once observ'd, that where a *Snail* has left such a Tract upon the Grass, a few Days afterwards I have found *Mushrooms* to come up: But it must be observ'd, that such as come up in this manner are not fit to eat. However, I suppose from Hints of this kind it was, that the edible Kind was first propagated in the Garden.

It is practis'd in *France*, to dig a Trench five or six Inches deep in the Ground, and lay in it either the Dung of *Horses*, *Mules*, or *Asses* Ridge-wise, in the Shape of an *Ass's* Back; then cover the Dung about two or three

three Inches thick with fresh Earth, such as is just taken from under a Turf, rather sandy than otherwise, and then cover the whole Bed either with Straw or dry Litter, as well to defend it from the Frost in the *Winter*, as from the scorching Heat of the *Summer's* Sun. The Bed being thus prepar'd, water it twice or three times a Week, without taking off the Covering of Straw, and in about two Month's time the *Mushrooms* will begin to appear, and must then be cut as they come up, and not drawn up by the Root. These Beds may be made every Month to produce *Mushrooms* all the Year about.

The late Famous Mr. *Harrison* of *Henly* made *Mushroom*-Beds much after the same manner, only instead of Horse-Dung he made use of old Thatch, which he told me turn'd musty, and grew moldy much sooner than Horse-Dung, and would produce *Mushrooms* quicker, and in greater Plenty; but either way will do very well.

So I have likewise known the *Melon* Ridges, which have been made as I have directed, about Autumn to produce *Mushrooms*, especially if the Earth upon them has not been of any great Substance; and that Straw or Litter has been laid upon them, and frequently water'd.

It is said, that the Cuttings of the *White Poplar* or *Abele* about the Root, being steep'd
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in hot Water, well fermented with *Yeast*, will produce very good *Mushrooms* in a few Days: And it is likewise reported, that the loose Chips of the same Tree, being buried in a decay'd Hot Bed, will do the like.

About *Naples* there is a Sort of *Stone* which produces good *Mushrooms*, if it be laid in a moist place, or well water'd.



CHAP. III.

Of ESCULENT ROOTS, or such as are proper for Table Use.

THE Roots which are commonly made use of for the Table are *Parsnips*, *Carrots*, *Turneps*, *Skirrets*, *Scorzoneria*, *Beets*, *Radishes*, *Horse-Radish*, *Potatoes*, *Jerusalem-Artichoke*, *Onions* and *Leeks*, and their Kinds.

SECT. I.

Of the *PARSNIP*.

TO begin with the *Parsnip*; it affords a large sweet *Root*, very nourishing, and of great use in the *Winter*: This Plant delights in a rich Soil, where the *Root* of it will

will become very large, but should not be eaten 'till the Frosts have entered the Ground. The *Seeds* of it are sown in *March*, and will come up in about three Weeks time; when they have been above ground about a Month, they must be hough'd, leaving the space of about five or six Inches between the Plants. A skilful *Gardener* will sow *Radishes* among them, which in about forty Days may be drawn off; or sometimes *Spinage*, which will also be fit to cut before the *Parsnips* begin to spread. And indeed it is not the least part of a *Gardener's* Skill to understand how to double Crop his Ground with such things as will not spoil one another. After the first houghing of the *Parsnips*, keep them as clean from *Weeds* as possible, 'till they are full grown, and then take them up and keep them in *Sand* for Use.

S E C T. II.

Of the CARROT.

CARROTS delight in sandy Soil, where their *Roots* will grow to a great bigness, and be much sweeter, and more free from Worms than those which are sown in rich Garden Ground. Sow those you design for *Winter* Use at the same time you sow *Parsnips*; and in the same manner fling in among them *Radishes* and a few *Lettuce*; when they are

come up, hough them as I have directed for the *Parsnips*, and take them up when they are full grown, to be kept in Sand for *Winter*. About *London* the Gardeners are curious to have young *Carrots* for the Spring, which they raise in the following manner. Towards the End of *July* they prepare a Piece of Ground, and sow it when it is most likely to rain; and about *Michaelmas* (if the Seeds be good) and the Weather has been favourable, the Roots will be somewhat larger than a Tobacco-Pipe, and the *March* following will be fit to draw for the Table; but this Crop must be soon gather'd, lest they run to Seed, which they will certainly do in *May*, and then they will not be fit to eat. But that there may not want some to succeed these, I have known an ingenious Gardener make a Hot Bed in *February*, which he cover'd about six Inches thick with Earth, and sow'd it with *Radish* and *Carrot-Seed*, covering it in bad Weather with Mats upon Hoops. The *Radishes* will soon be fit to draw, and the *Carrots* be ready for the Table about *May*, when the Spring Crop is gone.

S E C T.

S E C T. III.

Of the TURNEP.

TURNEPS have many Excellencies, and are more generally propagated about *London* than any other Root ; they are a wholesome Diet, and are of extraordinary Use to the Farmer for feeding Cows and Sheep. This kind of Root is always sweeter in a sandy Soil than any other Ground, but will have larger Roots if the Land be somewhat inclinable to Loam. From the middle of *July* to the tenth of *August*, and not later, the Seeds may be put into the Ground, that the Roots may have time to apple (as they call it) before *Winter*. When the *Plants* have two or three Leaves a-piece, they should be hough'd at the distance I prescrib'd for *Carrots* and *Parsnips*, and this Crop will be off time enough in the Spring either to sow *Barley* or any other Grain or Seed on the same Spot. It is seldom practised, tho' I think it would be very acceptable, to provide *Turneps* for the *Summer* : And indeed I see no reason why we may not have them all the Year about : We may sow them in the Spring as well as at Autumn ; but planting them out from Seedling-Plants in the Spring and Summer Months will do much better. I have
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more than once known the Experience of this way, and find it to answer as one would desire.

SECT. IV.

Of the SKIRRET.

THE *Skirret* has a very agreeable Root, altho' it is propagated but in few *Gardens*; and it may be, the Rarity of it is owing to the want of the right way of Cultivating it. We may propagate it two ways, either by sowing the Seeds in *March*, or by transplanting the *Off-sets* from the *Roots* in that Month: It delights in a light rich Soil, somewhat moist, which I find contributes to make the Roots large. About nine Years since a *Gardener* in *Surrey* sent to me for some *Seeds* of this *Plant*, and sow'd them in a black moory Soil, which had lately been a Plantation of *Asparagus*; in that Spot of Ground he had the largest *Skirrets* I ever saw, and very sweet; but about *London* 'tis more generally practis'd to raise them from Slips or Sets, which must be done thus: In *March*, when the Leaves begin to put forth, take them out of the Ground and part them into as many Slips as you can take off with *Roots*; but be sure let only the fresh springing *Fibers* remain on them, and not any of the old *Roots*; then prepare *Drills* about four or five Inches deep, to

PART III.

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plant them in five or six Inches a-part, and keep them well water'd 'till their Roots are full grown; then take them fresh out of the Ground, as you have occasion to use them. Some say the *Roots* will be larger if they are not suffer'd to run to Seed.

S E C T. V.

Of SCORZONERA and BEETS.

Scorzonera, or *Spanish Salsifie*, has a Root, which in my Opinion is no less pleasant than the former; it loves a light Soil, and is easily raised by sowing the Seeds in *March*: And *Beets* also, both the Red and White Kinds, are raised in the same Month from Seeds, and delight in a sandy Soil.

S E C T. VI.

Of the RADISH.

I Have already mention'd the *Radish*, as a Root which might be sown promiscuously among other Roots in *March*, but some particulars in the *Culture* of it, yet remains worthy the Knowledge of my Reader. The Soil it chiefly covets is Sand, or other light Ground well wrought with the Spade: It may be sown in such Land any time between *February* and *September*, minding always to let the Ground you sow be more in the

the *Shade*, as the Season is more hot. I have sown some *Seeds* of the *Spanish Radish* in *August*, that have been fit to draw just as the *Winter* began, and have continued good 'till the *February* following: But to have a Crop to succeed those, it is common to sow some at *Michaelmas*, that they may be above Ground in their *Seed-Leaf* only before *Winter*, and those will be in Season about *March*, if they have had the Shelter of some warm Wall.

SECT. VII.

Of HORSE-RADISH.

THE next Root I have to treat of is the *Horse-Radish*, which no *Kitchen-Garden* ought to be without. I have known some *Gardeners* plant Roots of it on a piece of Ground three or four Inches deep, and then letting it stand three Years, have taken it up for Market: But a much quicker and better way has been experienc'd by a Friend of mine for the propagating this Root, which was in this manner: Dig a Trench in some remote Corner of the *Garden*, about three or four Foot wide, and about sixteen or eighteen Inches deep; the Soil, if possible, should more encline to Sand than Clay; and at *Michaelmas*, which is the best time for this Work, cut some *Horse-Radish* Roots in

K 2

pieces

pieces of three Inches in length, or thereabouts, and sow them in the bottom of the Trench, covering them with the Earth that was taken out of it; the Spring following you will find them shoot above Ground, five or six Heads from each piece of *Root*, and the *Michaelmas* after that will be strong enough to take up; they will then be straight, well grown, and without Knots, fit for Use.

S E C T. VIII.

Of POTATOES.

Potatoes and *Jerusalem-Artichokes*, are *Roots* of less note than any I have yet mentioned; but as they are not without their Admirers, so I shall not pass by the Method of their *Culture* in silence. The *Potatoe* rather loves a sandy than a strong Soil, tho' I have seen them do well in both; but have observ'd, that the Roots knot much better, and are sweeter tasted in the *Sand*. The smaller Roots or Knots of them are commonly sowed to raise a Crop from, and set about four or five Inches deep in the Ground in *March*, at six or eight Inches a-part: When their Haulm begins to decay, which is about *Michaelmas*, we may take them out of the Ground with Forks as we have occasion to use them. Where they have liked the Ground, I have seen above thirty *Knots* or *Potatoes* hanging

hanging on the Strings or Fibers of one Plant.

The *Jerusalem-Artichoke* affords a *Root* as large as an ordinary *Turnep*, which in its Taste differs from the *Potatoe*, in being more watery and flashy : It is one of those *Plants* which can hardly be got out of the Ground it is planted in, and delights chiefly in a stiff Soil, where I have most commonly seen it growing ; every little part of the *Root* will grow if they are planted in the Spring like the *Potatoe*, and about the *Michaelmas* following will be fit for Use.

SECT. IX.

Of the ONION.

I Now come to treat of the *Onion*, a *Root* more generally used in the *Kitchen* than any other : Of this there are two Kinds worth the *Gardeners* Care ; the first is the *Spanish Onion*, which affords a large sweet-tasted *Root* ; and the other the *Strasbourg Onion*, which is more biting, and lasts good much longer than the former ; but the difference of these two Kinds make no Alteration in the Culture of them ; they should both be sown early in *March*, in rich Garden Soil, and hough'd about the latter End of *April* with a very small Hough, leaving about three Inches between the *Plants*, 'till they

K 3

begin

begin to grow fit for *Sallets*, and then they may be drawn or thin'd where they stand close together. In the sowing of this Crop, let not the *Gardener* be too sparing of *Seeds*, least many of them be naught, which often happens; and it may be too late in the Year to re-sow the Ground, when he is convinced the first *Seeds* have fail'd; better too many than too few; the Ground may be eas'd of too great a Burden, sooner than over-loaded with it. When the *Leaves* begin to change their Colour, the *Roots* will grow no more that Year, and then they may be pull'd up in dry Weather, and laid in Rows expos'd to the Sun, 'till they are dried as well as may be without Doors: After which let no Rain get at them, but spread them on the Floor of a *Green-House*, or such cover'd place, to dry more thorowly for laying up for *Winter*. Some of this Store may perhaps remain good 'till towards *April*, if they were well dried at gathering, and kept so afterwards; but it will be impossible, with the greatest Care, to keep many of them from growing in the House; and of those which happen to *spire* about the beginning of *February*, and have large *Roots*, plant them at two Inches distance in Lines, half a Foot a-part, to bring *Seeds* for another Year. When these have shot up the *Flower-Stems* about two Foot high, secure them with Sticks from the Assaults of the *Winds*; and as soon as the *Seed-Vessels*

Vessels begin to open, cut them off and spread them on a *Mat* in the *Sun* to ripen, turning them every Day for a Fortnight or three Weeks before they will be fit to be beaten out of their Husks: Take special Care no Wet get at them, for they will sprout with the least Moisture, and never afterwards be fit to sow. It is a certain Rule, That if any *Seed* has had Moisture enough to put forth its *Radicle* never so little, and is after that check'd before the *Ear-leaves* appear, it cannot by any means be made to grow afterwards.

The beginning of *August* we must sow a fresh Crop in some warm place to stand the *Winter*, and supply the *Kitchen* when the dry'd *Onions* are gone. This Sowing will be fit to draw in *April*, and furnish a Supply 'till the Spring Crop comes in.

SECT. X.

Of the LEEK.

THE *Leek* is sown in *March* in a well-wrought Ground, and should be hough'd like the *Onions*, and kept free from *Weeds*. In *July*, about the middle of the Month, plant them out in Lines about five Inches a-part in very rich light Soil, but chuse wet Weather if possible, which will contribute to make them very large; for one

K 4

Shower

Shower of Rain does more good to any new transplanted Herbs than twenty Waterings. The *Leek* will not bear *Seed* 'till the second Year, and then must be gather'd and order'd like *Onion-Seed*.

S E C T. XI.

Of GARLICK.

Garlick is propagated from *Cloves* of the *Root* planted early in *March*, about five Inches a-part ; the Soil light and sandy, for stiff Ground makes the *Roots* small : The *Blade* will begin to turn Yellow in *July*, and then take them up in a dry Day, and tie them in Bunches for Use. This and all other *Roots* that are to be kept the *Winter*, must be very well dry'd, or they will rot.

S E C T. XII.

Of ESCHALOTS.

Eschalots, or Shallots, are of such Use in *Cookery*, that a *Kitchen-Garden* ought not to be without 'em : A light sandy Soil is the most agreeable to them, without any Mixture of Dung : They are propagated by planting their *Cloves*, or *Off-sets* of the *Roots* early in *March*, about four Inches a-part, and will be fit to take up as soon as their

their Blade turns Yellow, which will not be 'till the latter end of *June*, or beginning of *July*, if they like the Ground; then let them be well dry'd and laid up for Use. N. B. About a Rod square of Ground, planted with these *Roots*, will be enough for the Use of any Family.

S E C T. XIII.

Of CHIVES and the ROCAMBOLE.

CHIVES should always be found in the *Kitchen-Garden*; they are frequently used in the *Winter* in *Sallets*, when young *Onions* are scarce. The *Off-sets* of their *Roots* should be planted at six Inches distance in *March*, cutting off their Blades at the same time; they love a light rich Ground and Shade: Thus order'd, they will be fit for Use at any time of the Year; and the oftener they are cut, the smaler will be their Grasse: About one Rod square of them will serve a large Family.

The *Rocambole*, for its high Relish in *Sauces*, has been greatly esteem'd formerly, but now a-days is hardly to be met with; I think however it should not be wanting in a compleat *Kitchen-Garden*; for considering how small a quantity of it is sufficient to give us that Relish which many *Onions* can hardly give, it ought to be prefer'd. The

Part

Part of this *Plant*, which is made use of, is the Head of the *Flower-Stem*, compos'd of many small *Bulbs*, which as soon as they are ripe should be gather'd and kept dry.

It is propagated by planting the *Off-sets* of the *Roots*, or little *Bulbs*, six Inches a-part in *September*, and delights in a sandy Loam, without any mixture of *Dung*.



C H A P. IV.

Of ASPARAGUS, ARTICHOKEs,
COLLY-FLOWERS, CABBAGES,
and others of the Cole-Race.

THE *Asparagus* is one of the great Dainties of the Spring, and what I account to be part of the most necessary Furniture of a *Garden*; it brings great Profit to the *Gardeners* near *London*, either propagated upon natural *Beds* (as they are call'd) or when they are forced with *Dung* in the *Winter*. I have heard that a *Gardener* about *Westminster* has receiv'd above thirty Pounds in one Week for forc'd *Asparagus*.

I shall therefore be very particular in setting down the Method of propagating this *Plant*, as well in *Natural Beds*, as in the
Hot

Hot Bed; and first begin with the *Seeds* and Manner of raising them.

Such as are minded to make a Plantation of *Asparagus*, should have a peculiar regard to the Goodness of the *Seed* they design to sow, for therein lies the chief hopes of Success; the largest *Buds* therefore should always be encouraged to run up as soon as they appear above Ground; and when they begin to branch must be staked up to secure them against the Winds: These vigorous Shoots will afford us *Seeds* well nourish'd, partaking of the Strength of the *Mother Plant*. The largest I have yet seen are the Produce of *Batersea* in *Surrey*, and such like Places, where the *Soil* is *sandy*; so that we may readily infer what *Soil* is the most proper for them. In Ground of that kind, without any mixture of *Dung*, I recommend them to be sown about the first Week in *March*, if the Weather be open. In this Seminary they come up without any Trouble, and will be fit to plant out the *February* or *March* following, either to train up for *Hot Beds*, or to be planted for a Crop in *Natural Beds*; for *Plants* of one Year old will thrive much better when they come to be transplanted in *Natural Beds*, than those that have stood two Years in the *Seed Bed*.

If we raise them for the *Hot Bed*, make choice of a piece of Ground that has been enrich'd with *Dung*, and well dug and mel-
low'd;

low'd ; upon which strike out Lines at seven or eight Inches a-part, and plant the *Asparagus Roots*, when they are one Year old, in them at four Inches distance: In this Nursery they are to remain two Years before they will be fit for the *Hot Bed*, cutting down their *Haulm* every *Michaelmas*, and keeping them free from Weeds, as we must do the Plants in the *Natural Beds*.

If we chiefly covet to raise *Asparagus* in the *Winter*, sow every Year, and make Plantations after the same manner related, to have Plants that may succeed one another. The *Hot Beds* must be made pretty strong, and cover'd immediately with Earth six Inches thick, encompass'd with *Straw-Bands* ; in this, plant your *Asparagus Roots* (taken fresh from the *Nursery Beds*) as close as they can be placed together without trimming them, or cutting off any of their *Fibers*. When this is done, cover the Buds of the Plants two Inches thick with Earth, and let it remain in that State for five or six Days before the Frames and Glasses are put over it, and then lay on three Inches thick of fresh Earth over the whole ; in about ten Days after Planting, the Buds will begin to appear above Ground, and then give them what Air the Season will allow ; for 'tis the Air that makes them Green, and chiefly contributes to their good Taste.

A *Bed* thus prepared will last good about a Month, shooting fresh Buds every Day, if the severe Weather does not hinder: As it begins to cool some warm Horse-Litter should be laid upon the Glasses every Night, which will contribute as much to make the Buds shoot, as if they were to have new Dung put under their Roots. The time for this Work is from *November* 'till *April*, when the natural Crop comes in, making fresh Beds every Month to follow one another, and give us a constant Supply.

But to plant *Asparagus* for a *Natural Crop*, we must proceed in a very different way. About the beginning of *March* (which is the best time for transplanting of *Asparagus*) measure out your Ground, allowing four Foot for the Breadth of each *Bed*, and two Foot for every *Alley* between the *Beds*; open a Trench at one End of it, and lay into the bottom of the Trench about the Thickness of six or eight Inches of Horse-Dung well rotted: Go on then to trench the same quantity of Ground, lying next to the first Trench, throwing the Earth which comes out of the second Trench upon the Dung laid in the bottom of the first: Continue to work in like manner 'till the whole Piece is compleated and level'd; then in Lines, at eight or ten Inches distance, plant the *Asparagus* taken fresh out of the *Nursery*, spreading their

their Roots, and covering their Buds with Earth, about four Inches thick.

When four Rows are planted, leave a Space for an *Alley* about two Foot wide, and proceed to plant four Rows more for another Bed, and so continue your Work 'till the whole is planted. As soon as that is done, sow the whole Piece with *Onions*, and rake it over as level as possible, for the *Alleys* will not be of any Use 'till after *Michaelmas*, when the *Onions* will be off, and the *Shoots* the *Asparagus Plants* have made that Summer must be cut down; then dig up the *Alleys*, and throw part of their Soil upon the *Beds*, to raise the Earth about five or six Inches above the Buds of the *Plants*, supplying the *Alleys* at the same time with Dung, or some rich Soil.

In this State let the *Beds* remain 'till *March* following, and then rake down the Earth. I have known some Gardeners set *Beans* about *November* in the *Asparagus Alleys* close under the Sides of the *Beds*, which may best shelter them from the *East Winds*.

The *Alleys* must be turn'd up in this manner every *Winter*, and now and then enrich'd with Dung; but we must be sure to let *Michaelmas* be pass'd before we cut down the Haulm of the *Asparagus*, and give them their *Winter Dressing*; and also that we are not later than *Mid-March* without raking
and

and laying smooth the *Beds* ; for after that time, if we should disturb the Earth, we should run the hazard of breaking many Buds that begin to shoot.

It is a general Rule not to cut any 'till the fourth Year after Planting, altho' the *Buds* are very large, for it weakens the *Roots* : However I think (to satisfy the Impatience of some) that where the *Plants* are strong ; as in the third Year, a few may be taken here and there in very small Quantities, about six times in the Season, without greatly hurting the *Plants*.

The fourth Year we may certainly begin to cut, and we shall then sensibly feel the Profit of our Labour and Expectation : Not any Bud that appears above Ground must be suffer'd to grow in the Cutting Season, unless they come from such *Roots* as have been planted to make good the Deficiencies of the first Plantation, and those must be suffer'd to run up every Year 'till they have gather'd Strength.

About the beginning of *April* the *Asparagus* appear above Ground, and may be cut 'till towards the beginning of *June*, when they have stood five Years, but will not bear cutting longer than *Mid-May* if they are younger : In the Cutting of them, have special regard to cut downwards a little sloping, with a Knife made blunt at the Point, lest you injure the *Crown* of *Buds* lying on the
the

the top of the *Root*; for if you cut them more horizontally, you may then injure several Buds that are under Ground: A Piece of *Asparagus*, thus carefully managed, will last good near twenty Years.

S E C T. II.

Of the ARTICHOKE.

WE may either propagate the *Artichoke* from *Seed* or *Suckers*, but the latter is most commonly practis'd; however let us use either way of raising them, we must be sure to allow them a strong rich Ground, with Dung mellow'd in it, well expos'd to the Sun: About the beginning of *March* we may sow the *Seeds* to be planted out the following *Month*; and the middle of *March* is the most proper Season to slip the *Roots*, either for new Plantations, or to make good the Deficiencies of the old ones, which seldom pass a *Winter* without some Loss, notwithstanding the greatest Care has been taken to preserve them. When we take off the *Slips*, we must leave growing upon every old *Root* (if it be strong) three Heads, which will give us so many good Blossoms about *Mid-June*; and the *Slips* we take off should be planted two Foot a-part in Lines, four Foot distant from each other, for nearer than that would hinder the

the thriving of the *Plants*. This young Plantation must be well water'd after planting, and perhaps may afford us some good Flowers about *September*, tho' for the sake of the *Plants* it is to be wish'd they would not; for when they blossom the first Year the Roots are endanger'd, therefore some *Gardeners* break off the Blossoms as soon as they begin to appear, and about the middle of *July* break off the Stems of the old Roots that have done blowing, that they may furnish themselves with fresh Shoots to stand the *Winter*.

SECT. III.

Of the COLLY-FLOWER.

WHoever is minded to propagate this *Plant* must chiefly have regard to the Goodness of the *Seed*, which ought to be sated only from such *Flowers* as were large and white, for otherwise there can be no hope of Success; and in the next place the Ground must be very rich, and not over dry. Being thus provided, we may begin to sow the *Seeds* in *March*, in some well-expos'd Corner of the *Garden*, where the young *Plants* may be shelter'd at their first coming up from the frosty Evenings. About the middle of *April*, when they are in their first *Leaf*, they must be planted in a *Nursery*, about five or six Inches a-part, and stand

there 'till the latter End of *May* or *June*, to be removed to such places as you design they shall blossom in; if it is possible, do this Work in rainy Weather, which will make them strike Root quickly; or else, if the Season happens to be dry, make Holes in the Ground like Basons, about three Foot a-part, and water them very well immediately before you plant the *Colly-Flowers* in them, which will contribute to keep the *Plants* fresh and green, 'till their Roots begin to shoot; by this means, and frequent Waterings when the Season is dry, we may expect large Flowers in Autumn, but especially if the *Alleys* between the *Plants* are floated with Water, which will nourish them much more than common Watering. Some of this Plantation will not offer to flower 'till after *Michaelmas*, and then such *Plants* must be taken up with the Earth at their Roots, and set together (upright) in a *Green-House*, or some other such like place, where the Blossoms will enlarge themselves, and be fit for Use in the *Winter*: So likewise if we have any *Artichokes* at that time fit to cut, take them with all their Stalk, and set them in Sand in the same place, which will preserve them good a long time.

But we must take a very different Method to have *Colly-Flowers* in the *Summer*; about the 20th of *July*, or first Week in *August* at farthest, we must sow the *Seeds* upon

upon some decay'd *Hot Bed*, and transplant them about three Inches distance, as soon as they have made their first *Leaf*, upon some other well prepared *Bed*: The middle of *September* draw out every other *Plant* from that Plantation, and set them four or five Inches a-part, either under a *South-Wall*, to stand there 'till Spring, when they are to be planted out for Flowering, or else set them in the places where they are to blossom, and cover them with *Glass-Bells* in the Severity of the *Winter*; and this last Method I think to be the best, because they will be well rooted in the Spring, and consequently be better able to make large Blossoms than those that are planted in the Spring, and have the Difficulty of making new Roots when the others are growing.

Those *Colly-Flowers* that are planted out at *Michaelmas* will Flower about three Weeks sooner than those that are planted in the Spring; however it is necessary to make Plantations in both Seasons, that they may not all blossom at one time, but gradually succeed one another. An understanding *Gardener* will also make his Spring Plantation of *Colly-Flowers* at several times, allowing three Weeks or a Month between each; and by that means (altho' all the Plants were rais'd at one time) the checking them at different Periods of Growth, will make them blossom earlier or later by two or three Months.

It is a Rule which ought to be observ'd, when we plant late in the Spring (in *May* for Example) to set our *Colly-Flowers* where they may not have too much *Sun*: I have known some do very well between *Artichoke-Plants*, and in such like places; and then it must also be observ'd that they have *Water* enough, for they are great *Lovers* of it. When the *Blossoms* begin to appear, break some of the great *Leaves* and lay over them, to keep the *Flowers* from *Rain*, and the scorching *Heat* of the *Sun*, which would make them turn *Yellow*.

In *March* and *April* take care to shelter them from the *Winds*, which are very apt to damage them, and sometimes blow them up by the *Roots*: I would advise, that if you have a good kind of *Colly-Flower* that blossoms early, and has large and close *Flowers*, to let some of the forward *Plants* stand for *Seed*, carefully tying them to *Stakes*, that the *Winds* may not injure them. When the *Seed-Vessels* are full grown, and the *Seeds* within them are perfected, cut off the whole *Stalk*, and let it dry in the *House* before it be thrash'd out; for it is not necessary to leave the *Seed* upon the *Plants* 'till the *Pods* are dry, lest they open and shed.

SECT.

S E C T. IV.

Of CABBAGES, and their Kinds.

WE have several Kinds of *Cabbages*, the large *White Cabbage*, of which the Gardeners at *Batersea* in *Surrey* have a Kind that comes very early, and is the best for *Summer Use*: If it be sown in *July*, and stands the *Winter*, I have known some of them ripen in *May*; or else, if we are minded to have of them ripe in the *Winter*, sow them in *March*, and plant them out in *July* at two Foot distance, watering the Ground well before Planting, if the Weather be dry. In the same manner also must be sown and planted the *Savoy-Cabbages*, or *Savoys* (as they are call'd) for *Winter Use*, for they are not good 'till the Frosts have pinch'd them: These and all other kinds of *Cabbages*, will put forth Sprouts from the Stalks, that towards the Spring are even preferable to the *Cabbages* themselves, and will continue so to do 'till the middle of *April*, about which time Greens of this kind are very scarce, and therefore young *Cabbage-Plants* and *Coleworts* that were sown in *July* or *August*, are then the only Greens, except *Spinage*, that we have recourse to.

When we have a right sort of *Cabbage* to our mind, we may plant it for Seed in the following manner: In *January* make choice of the driest part of the *Garden*; and having strip'd some full-grown *Cabbages* of their loose Leaves, plant them so deep in the Ground that none of the Stalk appear above it, and then make up a Bank of Earth round about the *Cabbage* it self, so that none of it be seen but the Top, from whence the Flower-Stems will begin to break in *March* or *April*, and then must be staked up as the *Colly-Flowers*: The *Seed*, when it is full grown, must be gather'd, and order'd like that of the *Colly-Flower*.





CHAP. V.

Of LEGUMES or PULSE; such as
BEANS, PEAS, KIDNEY-BEANS,
&c.

SUCH as design to propagate *Beans* or *Peas*, must have a large parcel of Ground; for 'tis not a small Quantity will suffice to furnish a very moderate Proportion of them; more especially because they should be sown at indifferent Seasons: That from the time they first come in, to the beginning of *Winter*, we may always have a fresh Supply of young ones, as the former Crops decay.

SECT. I.

Of BEANS.

THE *Bean* has many Varieties; two Kinds of which I shall only make mention of, viz. The *Spanish Bean* for an early Crop, and the broad *Windsor Bean* for the *Summer*: The first of these are commonly put into the Ground in *November* or
L 4 *December,*

December, about five Inches a-part in some well-exposed place, commonly in a single Line under a *South-Wall* or *Hedge*, to shelter them from the sharp Winds of the *Winter*; but I rather make choice of a *Hedge* than a *Wall*, for this Reason, that when the *Beans* are above Ground, and the *Frost* takes them, the *Wall* will, when it is somewhat warm'd by the *Sun*, thaw them and the Ground where they stand, 'till *Night* comes on, and then they freeze again; and so if the *Frost* lasts any time, they are continually haras'd in this manner, *Night* and *Day*, 'till they are destroy'd. But on the contrary, a *Hedge* shelters them from the sharp Winds, and not reflecting any Heat upon them in the *Day*, as a *Wall* will do, the *Plants* remain in the same frozen State, 'till a general *Thaw* releases them, without undergoing such violent Fits of Alteration, which must certainly impair their Parts.

If we have double Lines of these forward *Beans*, let not the Rows be nearer together than two Foot, for else they would smother each other when they come to grow up, and then by running too much into *Stalk*, would produce but few *Blossoms*, and less *Fruit*: It must be observ'd likewise, that if they have shot any considerable length before the severe *Frosts* begin, they must be earth'd up within a little of their *Tops*; and in the Time of their *Blossom*,
cut

cut off the Top of every *Bean-stalk*, to make them set their *Fruit* the better.

About *February* we may set a second Parcel of Ground with *Spanish Beans*, to come in after the former; and in *March*, plant some *Windsor Beans* for the first time, for they are tender, and cannot bear the *Frosts*. I have been told by Mr. *Furber* of *Kensington*, who I have had occasion to mention before for his Ingenuity, that if we set the Rows about a Foot assunder, suffering them to grow 'till they are almost ready to blossom, and then cut down every other Line within two or three Inches of the Ground, we shall then have a double Crop of *Beans* from the same Sowing, one coming in about *July*; and that which was cut down, springing afterwards afresh from the Roots, will have *Beans* about *Michaelmas*: 'Tis therefore I would advise, that if it should happen that two Crops of *Beans*, sown at different Seasons, should by Accident tend to blossom at the same time, as they often do, cut down one of them to have a late Crop.

'Tis also necessary to set *Beans* in *April* and *May* in moist places, and then they must be allow'd a greater distance between each other than those that were planted forwarder in the Spring; but above all, keep them clear of Weeds; and I think it would be good Husbandry to water them about the time of their Blossom, if the Season be dry.

dry. I have known likewise *Beans* planted in *June*, that have yielded a very good Crop late in the Autumn.

Beans love a stiff Soil, without any Manure : When their Seeds are full grown, the Plants may be pull'd up by the Roots, and set to dry in some well-expos'd place, and then thrash'd out for Use.

S E C T. II.

Of PEASE.

THE Kinds of *Pease* which I shall mention, are the *Hotspurs* for *Winter* Sowing, the *Dwarfs*, and the *Roncival*, or *Dutch Admiral*, to be sown in the Spring ; these Sorts may well enough suffice for any *Garden*, without enumerating at least fifty other Kinds that I have heard of, which perhaps are so near a-kin to these, that the difference can hardly be distinguish'd but in the Names only. I have often wonder'd at the Indiscretion of some People, who take a Delight in giving cramp Names to Plants, and make it their Business to multiply Species without Reason, as if a Fruit would be the better for a Name that could not be understood ; or that the Works of Nature were not already numerous enough for us to contemplate : But to say no more of that vain Humour, which too many are
subject

subject to, I shall proceed to lay down what I have observ'd relating to the Culture of *Pease* in a Garden.

It is not one of the least Perfections of a good Gardener, if he has Ground enough, to provide so many Crops of *Pease* every Year, as may furnish a Table throughout the whole Summer: About *November* or *December* is soon enough to sow the first Crop; for if they were put into the Ground sooner than those Months, they would be endanger'd by the Frosts: Some of the *Hotspurs* are the most proper for that Season to be sown in *Drills*, each *Drill* about two Foot from the other, the Lines running from *North* to *South*. When they have shot about six Inches high, Earth them up about four Inches on both Sides of the Lines, raising a little Bank on the *East* Sides of them, to defend them from the *Blasts* which accompany the *East Winds*.

In *February* a second Crop of the same kind of *Pea* should be sown, and in *March* we may put in a third of the same Sort. About the beginning of *April* some Ground may be prepared for sowing some of the *Dwarf Pease*, especially the very short Kind, which seldom rises higher than half a Foot, or covers more Ground than six or seven Inches square; and notwithstanding the smallness of this Plant, it will yield near as many *Pease* as one of the largest Kinds,

and those not inferiour to any in their Taste; these *Pease* should be set four or five Inches a-part, in Lines about eighteen Inches distant from one another if they are design'd for Table use; or if they are planted for Seed, the Lines need not be above a Foot a-part, for then there will be no occasion to go between them 'till they are ripe enough to be pull'd up.

Besides this small Sort, there is another kind of *Dwarf Pea*, which rises about a Foot high, a very good Bearer, and well tasted: This Sort may be sown thicker than the former, because they carry their *Vines* more upright; but the Lines should be two Foot a-part. In *April* these may be sown, or in *May* or *June*, as well as the former, to have a constant supply of young *Pease* following one another: The smallest sort I have sown in Edgings, and have gather'd great Quantities from them; and I think them much the best for *Hot Beds*, if we covet *Pease* in the *Winter*, as they take up but little room, and afford a considerable Crop: I am assured one *Bed* of them will yield as many *Pease* as three *Beds* of the same size sown with the common sorts: For this End sow them upon a gentle *Hot Bed*, the first Week in *September*, about five Inches a-part.

The end of *April*, or beginning of *May*, is a right Season for sowing the *Roncival*, or
Egg-

Egg Pea, which is also call'd the *Dutch Admiral*; this is the most rampant of all the *Pea* Kind, and therefore requires more room than the others; sow them about two or three Inches a-part in Lines, planting two Rows within eighteen Inches of one another, and then leave a space of two Foot and half, for an Alley to pass through when they are fit to be gather'd: Having allow'd this Passage, plant two Lines more, eighteen Inches a-part, and so continue to do, allowing the breadth of two Foot and half for each Alley, 'till the whole Piece is sown. When they are grown about six Inches high, Earth them up like the others, and set one row of Sticks or Boughs, about six Foot high, between each double Line of *Pease* for them to run up, and they will bear plentifully; which they never will do if they are set too close together, or are not staked up.

S E C T. III.

Of the KIDNEY-BEAN, or FRENCH
B E A N.

WE have two Sorts of *Kidney-Beans* common in our *Gardens*; the one which bears early near the Root; without running high, call'd the *Batersea-Bean*, and another Kind, which is more rampant, growing near six Foot high, if it is stak'd up.
Besides

Besides these, I have seen above fifty other sorts that have been brought from foreign Parts, but seldom produce any quantity of Fruit in our Climate.

We sow *Kidney-Beans* the first Week in *April*, in a light fresh Soil, making *Drills* from *North* to *South*, laying the *Beans* in them about four Inches a-part, and covering them with Earth, rais'd in a Ridge to keep the Wet from them; for if the Ground be over moist it rots them.

The Lines of the *Batersea-Bean* should be two Foot a-part, and the other Kind should be sown after the same manner as I have prescrib'd for the *Roncival Pease*, *i. e.* in double Rows and Alleys between them, two Foot and half wide. The *Batersea* Kind need not be staked, but the others will not bear well without they are staked. From the first Sowing in *April*, we may once every three Weeks, 'till the middle of *July*, continue to sow fresh Parcels of Ground with *Kidney-Beans*, to succeed one another 'till the *Winter* comes in.

We must observe, that when the Ground is very dry, as in *June* and *July*, and the Weather likely to be hot, we must water the *Drills* as soon as we have open'd them, before we put in the Seed, which will contribute to make them sprout; but we must avoid watering them after they are sown, least we rot them.

Out

Out of Curiosity I have known some of the *Batersea* Kind of *Kidney-Bean* sown in *Hot Beds*, five Inches a-part, about the first Week in *September*, and they have had *Beans* fit to gather about *January*; but these, as well as other *Plants* of this Nature, when they are forc'd, must have all the Air that can possibly be allow'd them, or the *Plants* will be apt to decay.

The *Wing Pea*, when it is very young, is by some dress'd and eaten like *Kidney-Beans*, but in my Opinion are not near so good; the *Blossoms* indeed are of a beautiful Colour, and make a good Show in a *Garden*, if they are set in *Edgings*; it grows in any Soil without difficulty, if we put in the Seeds in *April*.



CHAP. VI.

Of SALLETS, *their Culture.*

AS the different Humours of Mankind will not allow me to prescribe any certain Mixture of Herbs as the most pleasant to the Palate, so I shall content my self with giving my Reader only some general Hints relating to the several sorts of common *Sallet-*

Sallet-Herbs, and leave every one to please himself in the Mixture of them.

I would have the Relish of the several Herbs consider'd, as for Example, which are most hot and biting; as *Cresses*, *Mustard*, *Sellery*, *Taragon*, *Chervil*, &c. and the more cool and insipid to the Taste, as *Turneps*, *Rape*, *Spinage*, *Corn-Sallet*, *Lettuce*, *Purslane*, and such like; by this Knowledge a *Gardener*, when he composes a *Sallet*, will so judiciously mix his Herbs, that the too strong Taste of one Kind may not overpower all the rest, and discreetly make use of the insipid Sorts to qualifie the Pungency and Heat of the others, as the Season of the Year is more hot or cold; so that every *Sallet* we eat may not only be agreeable to the Taste, but also a sort of Physick to the Body.

SECT. I.

Of SMALL HERBS.

WHAT the *Gardeners* call *Small Herbs* in *Sallets*, are such as should be always cut while they are in the *Seed-Leaf*; such are *Cresses*, *Mustard*, *Radish*, *Turnep*, *Rape*, *Spinage* and *Lettuce*; all these are commonly known to *Gardeners*, and are generally raised by them from the Seeds sown in *Drills* or *Lines*, about a Yard in length,

length, in such an Exposure as the Season of the Year requires; that is, from *Mid-February* to the end of *March*, under Glasses and Frames; and from that time to the middle of *May*, upon natural Beds of Earth, warmly expos'd; and afterwards, as long as the Summer Heats remain, in more shady places. About the middle of *September* and *October* make your *Sallet-Beds*, as I have advis'd in *February* and *March*; and then as frosty Weather begins to come in, prepare moderate *Hot Beds* to sow your *Sallets* upon, to be continued during the *Winter* Months; these should have as much Air as possible, as well to give them Colour, as to help their Taste. It sometimes happens, when the Frost is very violent, that the *Small Herbs* are frozen, notwithstanding the greatest care; but I am told, that putting them into Spring-Water for two Hours before they are used, will recover them. I likewise find it is the best way to draw the *Small Herbs* up by the Roots, from the *Hot-Beds*; for if the Roots are left in the Earth, when you sow a second Crop of *Salleting* upon the same *Bed*, it will not prosper. Also it shou'd be observ'd, in sowing the second Crop, that Seeds of the same Kind should not be sown in the same Place, but ease the Ground with varying its Burden, putting the *Seeds* of hot *Herbs* where the cool ones grew before; and this ought always to be observed in the

Culture of every *Plant*, that we do not place them immediately upon that Spot where the same Kinds have just been growing. The most skilful *Farmers* and *Gardeners* observe this Rule with that Exactness, that it seems as if one kind of *Plant* meliorated and prepared the Ground for the Reception of another.

For the greater Perfection of our *Winter Sallets*, it would be well to sow some Lines of *Cresses* in the natural Ground about the middle of *August*; for they will resist the Frosts of the *Winter*, and help greatly to enrich our *Hot-Bed Sallets* with the high Taste they acquire, by being expos'd in the open Air. Likewise at the same time sow a *Bed* of *Chervil* for *Winter* Use, as well to mix among our *Sallet-Herbs*, as to put in *Soops*, &c.

SECT. II.

Of SELLERY and ENDIVE.

OUR *Winter Sallets* are likewise greatly improv'd by blanch'd *Sellery*, which is a hot *Herb*, of a very rich Flavour; it is raised from Seed sown in *March* and *April*, in light Earth, in some well-expos'd part of the *Garden*, and planted out, about six Weeks after it is come up, in Beds, allowing four Inches distance between the *Plants*; they may there remain 'till the middle of *June*,

at which time some of the first Sowing will be fit to plant in Trenches for blanching. The Trenches must be cut by a Line, eight or ten Inches wide, and about the same depth, and as soon as they are made, put in your *Plants*, after having prun'd off the Tops and Roots of them: They must not stand nearer together than five Inches, if they are strong; and as they grow large, Earth them up within four or five Inches of their Tops, and so continue to do at several times, 'till they are fit for Use. It is necessary to make three or four different Plantations of *Sellery* at several times, one to come later than the other; and we may note, that these *Plants* will not be white 'till six Weeks after they are Earth'd up; they love a light rich Soil.

Endive, when it is blanch'd, is much used about *London* in *Winter Sallets*; tho', in my Opinion, it is a Plant hardly worth our trouble, as it has neither Taste or Flavour: It loves a light rich Soil, and should be sown about the latter end of *April*, lest it run to Seed, as it is apt to do, if it is sown too early in the Spring. When it has been come up about six Weeks, plant it in Beds as I have directed for the *Sellery*, and about the middle of *July* plant it in Rows, about six Inches a-part; and as soon as it is well grown, tie up some of it to whiten; and every Fort-night, as long as it lasts, tie up fresh Parcels of it.

S E C T. III.

Of the CABBAGE-LETOUCE.

WE have great Varieties of *Lettuce*, many of which have been more esteem'd for their Rarity than for their Goodness; but of all that I have yet try'd, I find none to exceed the good Qualities in the *Roman Lettuce*, the *Dutch Brown Lettuce*, and the *Imperial* and *Silecia* Kinds; all which sorts Cabbage extreamly well, and are well tasted.

The *Brown Dutch Lettuce*, if it be sown about the middle of *August*, will be fit to transplant in *September*, to stand the *Winter*, either for Cabbaging early in the Spring, or to be cut for *Winter Sallet*; it loves a rich light Soil, and warm Exposure, as do all of this Tribe, especially if they are sown towards the Autumn. The *Imperial* and *Silecia Lettuces*, if they be sown about the same time with the former, and planted out in warm places, will be very large, and be fit to cut very early in the Spring; but the *Roman Lettuce* I have not known to bear the Frosts.

In *March* are commonly sown all these Kinds in the open Ground among other Crops, as I have already hinted elsewhere: And that there may not want a constant Supply of them, sow some every Month from *March*, 'till you put in the *Winter Crop*,
and

and plant them out in Beds, about five Inches a-part, three Weeks after they come up; for transplanting them contributes to make them Cabbage.

Such as produce large *Cabbages* early in the Spring, may be suffer'd to stand for Seed, and should be stalk'd up lest the Winds annoy them; but the *Imperial* Kind will hardly run to Seed if the Crown of its *Cabbage* be not cut cross-ways, and carefully open'd to give way for the *Flower-Stem* to shoot; and then likewise the *Plant* will be in danger of rotting, if it should rain; therefore fix a *Glass Bell* over it: The *Seeds* will be fit to gather as soon as they begin to shew their *Down*, and then pull up the *Plants*, and set them to dry in a *Green-House*, 'till you find the *Seed* is fit to be thrash'd out.

It is observable, that tho' the *Plants* we save the *Seeds* from were of extraordinary good Kinds, yet those *Seeds* will degenerate from the *Mother Plant*, if they are cultivated in the same *Garden* where they were saved: Therefore if you can possibly meet with an honest Correspondent, who gathers yearly the *Seeds* of such *Plants* as you have occasion for, change with him every Year, and you will both find your Advantage by so doing.

S E C T. IV.

Of BURNET, CORN-SALLET, PURSLANE, SORREL, SPINAGE and TARAGON.

THE Contents of this *Section* will be of the *Culture* of certain *Herbs*, which are often used in *Sallets*, and serve as Additionals to those I have before mention'd. *Burnet* is a cool *Herb*, a perennial *Plant*, whose tender *Leaves* being mix'd with other *Sallet-Herbs* in the *Winter*, gives us the agreeable Flavour of *Cucumbers*: It is propagated by Seeds sown in *March*, and may likewise be encreased at that time by parting the *Roots*.

Corn-Sallet is raised from Seeds sown any time of the Year, and makes a very good *Sallet-Furniture* in the *Winter*.

Purflane is an insipid *Herb* to the Taste, but very cooling, and is admir'd by some People in Summer *Sallets*: We have two sorts of it, the *Golden Purflane* and the *Green* sort, which are both rais'd from Seeds sown in some warm place in *April*, or may be sown earlier if they have the help of *Glasses*.

Sorrel is also used in *Sallets*, especially in the Spring the young *Leaves* are very agreeable; it is raised from Seeds sown in *March*, commonly in Rows or Drills.

Spinage I have already mention'd to be one of the necessary Ingredients in raw *Sallets*, to be cut in the *Ear-Leaf*; but it is of far greater Use for boil'd *Sallets* in *Winter* and the Spring. The beginning of *August* it should be sown in some place well expos'd to the Sun, that the *Leaves* may be large enough to cut for boiling in the *Winter*; and in *March*, *April* and *May*, we must not fail to sow several parcels of Ground with it at different times, about a Fortnight distant from one another, to supply the Table constantly 'till other Greens are plenty; for in the Spring one Crop will hardly last good longer than a Fortnight without running up to Seed. We have two Kinds of it, the *prickly* Sort, and the *round Spinage*, differing in the Shape of their Seeds according to their Names, but I find no difference in their Taste when they are boil'd.

Taragon, of all other Herbs, should not be wanting in a *Sallet*, as it is a Cordial Herb, tho' the Taste of it may not perhaps be so grateful to the Palate at first as the common Herbs: For my own part, I think it pleasant, if there is not too much of it; a few Leaves, or three or four of the tender Tops, are enough to give a *Sallet* an agreeable Relish. This *Plant* loves a warm Exposure, and is propagated from Slips taken from the Root and planted in *March*.

In the Spring, *Dandelion* blanch'd, which may be gather'd almost in every plough'd Field, is an excellent Sallet being mix'd with other Herbs. Some likewise gather *Violet* Flowers, *Cowslips*, and the Blossoms of *Burrage*, as part of their Sallet Furniture; and in the Summer the Flowers of the small *Nasturtium Indicum*. In short, whoever is once acquainted with the different Flavours of the several Herbs I have named in this Chapter, may easily please himself with a *Sallet*.

N. B. Whatever Seeds are saved or gathered, must be very well dry'd and ripen'd before they are thrash'd out; and then after cleaning them, must be expos'd to the Air and Sun for a Week at least before they are laid up, otherwise they will mold and rot.





C H A P. VII.

Of P O T - H E R B S, and such are as commonly used for Stilling.

THAT I may not omit any thing that is proper to be done in the *Kitchen Garden*, I propose to treat of such *Plants* and *Herbs* in this Chapter, as are commonly used for *Stilling*, and are sometimes dry'd for the Use of the *Kitchen*; and first of such as are *Aromaticks*.

Rosemary and *Lavander* are both durable *Plants* and *Ever-greens*; they love a light sandy Soil, and are both raised from Slips planted in *April*; quickly taking Root if they are Shoots of the last Year, but will not grow if they are older: They are apt to suffer by the Frost, especially if they have too much Wet, and therefore should be planted chiefly in the driest parts of the *Garden*, where they may be the most expos'd to the Sun. *Lavander* makes a fine Edging in large Walks, if it be often clip'd; but for the sake of its *Flowers*, which are often used, we must have a Plantation of it a-part; for were the Edging *Plants* suffer'd to flower, their Beauty would be spoil'd.

Thyme

Thyme and *Hyssop* are either raised from Seeds sown in *March* or *April*, or propagated from Slips planted in those Months: We have many sorts of *Thyme* of various Scents and Uses; the *Pot Thyme*, *Lemon Thyme*, and a Sort with variegated Leaves are most commonly cultivated, and make very good Edgings that will last seven or eight Years: And beside them the *Mastick Thyme*, and the *Marum Syriacum* or *Cat Thyme*, are cultivated in many *Gardens* for the sake of their refreshing Odour; but the latter, if it is in small Quantities, must be carefully defended from the *Cats*, who love to eat it, and are intoxicated with it; but I observe, where it is in abundance the *Cats* never disturb it. These two last Kinds should be planted in the warmest parts of the *Garden*, the others will grow any where.

Sage has many Varieties, but we propagate only three sorts of it, viz. The *Red Sage*, the *Tea Sage*, or *Sage of Virtue*, and the *Wormwood Sage*; these Kinds are raised from Slips taken from the Roots about the beginning of *April*, and planted a Foot a-part in light Earth. The *Sage of Virtue* should be cut for drying when it is full of young Shoots, for those only are fit to make *Tea* of; they should be gathered in a dry Day about Noon, and laid to dry in the Shade to be preserv'd for Use. I have been often told, that the *Wormwood Sage* is preferable to the former,

former, affording a pleasanter Liquor, and more grateful to the Stomach.

We seldom meet with more than two sorts of *Rhue* in our *English Gardens*, and their difference only consists in the Colours of their Leaves; the one being variegated with Cream Colour, and the other of a plain Green: This *Plant* delights in shady Places, and is easily multiply'd by Slips set in *April* in a light Soil. In times of Pestilence this *Plant* has been much in request, believing it prevents Infection.

Mint, or *Mentb*, and *Baum*, should neither of them be wanting in a *Kitchen Garden*; they are propagated by parting their Roots any time in the Spring, and will grow any where. *Mint* indeed is more generally cultivated than the other, as it is of it self a pleasant Sallet, and good in Soops and some Sauces, besides its extraordinary use in *Stilling*: When it is about a Foot high, it should be cut to dry in Bunches for *Winter* Use, observing this as a general Rule, to cut every *Herb* design'd for drying in a dry Day, and then to dry them in the Shade.

Some *Gardeners* think it worth their while to plant some large Roots of *Mint* in the Corners of their *Hot Beds* about *November*, that they may have young Shoots of it to mix among their *Winter Sallets*.

Tansie is increas'd by parting the Roots in the Spring, and is a *Plant* so valuable that
it

it must not be wanting; some of it should always be kept dry in the *Winter*, especially for the Use of those who are afflicted with the *Gout* in their Stomach: It is of that soveraign Efficacy in that Case, as I have found by Experience, that I think I should be guilty of ill Nature, if I was to pass by this Opportunity of making known the Method of using it. Boil half a handful of this *Herb* in half a Pint of strong *White-Wine*, and drinking this Decoction as hot as possible; I have always found it to remove the Pain in less than a Quarter of an Hour.

Wormwood is either raised from Seeds or Slips planted in *March*; it will grow in any Soil, and be apt to over-run the Ground, if it be eaten by Hogs when the Seeds are ripe, which passing thro' their Bodies germinate and come up very quickly.

Penny-royal and *Camomile* are useful *Herbs*, and very well deserve Place in the *Garden*; they delight in moist shady Places, and prosper best in a stiff Soil; they are both propagated from Slips planted in *March* or *April*.

We have two Kinds of *Marjoran* commonly propagated in *Gardens*; one Sort called the *Winter Sweet-Marjoran*, which will resist our Frosts, and remain good two or three Years without renewing, and the other is sown annually upon the *Hot Bed* in *March*, not being able to defend it self from the

the Violence of our Winters: The first Kind is increas'd by planting the Slips about *March* or *April* in moist Places, but has not that agreeable Scent which we find in the other; therefore some of the last Sort should be dry'd every Year when it is grown pretty large.

Carduus is rais'd from Seeds sown either the middle of *August*, or in *March*; but I commend the Autumn *Plants* before those rais'd in the Spring, as they are much larger, and more vigorous than the others, and besides have a much better Season to dry in.

Angelica is rais'd from Seeds sown in *March* in a moist rich Ground; it is a *Plant* that lasts good for several Years without renewing, and is of great Use.

Dragons ought also to be found in our Garden, as well for the Beauty of the *Flowers*, as the Use made of the whole *Plant* in many Cafes; it is multiply'd by transplanting the Suckers taken from about the Root in *March*: This *Plant* loves a fresh natural Soil and Shade.

Fennel and *Dill* are both propagated alike from Seeds sown in the Spring; they are useful *Herbs*, and should not be wanting in a *Garden*; the first having its tender Stalks blanch'd like *Sellery* makes a very good Sallet.

Parsley and *Clary* are also very useful Furnitures of a *Kitchen Garden*, both cultivated with

with great Facility, and rais'd from Seeds sown in *March*, and renewed every Year.

I have now (I think) mentioned every *Plant* that is requir'd to grow in a *Kitchen Garden*, and would advise, that the several Kinds I have treated of in this Chapter be planted in some place near the House, for the Conveniency of gathering them with little trouble when they are wanted.



C H A P. VIII.

Of *ENGINES* for raising of *WATER*,
with some *Observations* and *Experiments*
for the meliorating of *Water* for the Use
of *Gardeners*.



AS it is impossible to have either a fine or profitable *Garden* without the command of good *Water*, I am perswaded this Chapter will not be unexceptable to such Gentlemen as have their *Gardens* unfortunately scituated remote from it; but especially if by the Assistance of some *Engines*, which I shall here mention, they may be taught how to bring it, with little Trouble, to their Houses or Gardens, altho' they have their Station upon the tops of Hills, or other places remote from *Water*.

First,

First, Supposing the Situation of the House or Garden to be a considerable Height above any Pond, River, or Spring, and that it has at present no other Conveniency of *Water* than what is brought continually by Men or Horses to it: In this Case the wonderful Invention of the late Mr. *Savory*, F. R. S. for raising *Water* by *Fire*, will not only supply the Defect, by flinging up as much *Water* as may be desir'd, but may be maintain'd with little Trouble, and very small Expence. It is now about six Years since Mr. *Savory* set up one of them for that Curious Gentleman Mr. *Balle* at *Cambden House*, which has succeeded so well, that there has not been any want of *Water* since it has been built; and with the Improvements since made to it, I am apt to believe will be less subject to be out of order than any *Engine* whatever.

For the Satisfaction of the Curious, I have given a Design of it, Fig. I. of the second Plate, agreeable to that at *Cambden House*, which is, I think, the truest proportion'd of any about *London*; the several Parts of it, and the Manner of working it, I shall explain as follows.

A The *Fire*;

B The *Boiler*; a Copper Vessel of a Spherical Figure, in which *Water* is boiled and evaporated into *Steam*, which passes thorow

C The

- C The *Regulator*, which opens to let it into
 D The *Steam-Pipe* (of Copper) thorow
 which it descends into
 E The *Receiver*, which is a Vessel of Cop-
 per; that at first setting at Work is full
 of Air, which the *Steam* will discharge
 thorow
 F The *Engine-Tree*, and up the *Clack* at
 K (The *Plug* of the said *Clack*, to come at
 and repair the same if need be) and
 so the Air goes up
 L The *Force-Pipe*. — After E is void of
 Air, which is to be found by its be-
 ing hot all over, then stop the *Steam*
 at C, and throw a little cold Water
 on E, and the *sucking Clack* will open
 at
 I (Which is the *Plug* of the said *Clack*) and
 fill E with Water, which will ascend
 thorow
 G The *Sucking-Pipe*, from
 H The *Pond, Well, or River*.

This being done, proceed to raise your
Water, viz.

First, Turn C to let the *Steam* pass from
 the *Boiler* into E, and it will force the *Water*
 therein thorow F by K up L; which *Water*
 cannot descend, because of the *Clack* at I.
 When E is thus emptied, which may easily
 be perceived by its being hot as before, turn
 C and confine your *Steam* in B; then open
 the

the Cock M, which will let a little cold Water into E, and that by condensing the *Steam* in E, will cause the Water immediately to ascend form H, and replenish E.

Then turn C to let the *Steam* into E, and it will force the Water out of it up L into a *Cistern* O, placed at the Top to receive it. Then confine your *Steam* at C as before, and turn M for the space of a Second or two of Time, and E will be refill'd, which may be again discharged up L as before: So this Work may be continued as long as you please, if you keep Water in B.

If you turn the Cock N, and then only *Steam* comes out of it (without hot Water) the *Boiler* must be replenish'd with fresh Water; but our *Boiler* of Water will last a long while.

When you have rais'd Water enough, and you design to leave off working the *Engine*, take away all the *Fire* from under the *Boiler*, and open the Cock N to let out the *Steam*, which would otherwise (was it to remain confin'd) perhaps burst the *Engine*.

The Proportion of the several Parts of this *Engine*, as it now stands at *Cambden-House*, is thus:

The *Pipe*, from the Surface of the Water to the *Engine-Tree* F, is sixteen Foot, which is the length it sucks the Water (but might be made to draw Water about twenty eight Foot.)

From the *Engine-Tree F*, up to the great *Cistern*, which receives the Water, is forty two Foot (but might be a hundred Foot high, if such a quantity of *Steam* be allow'd as is proportionable to the length of the *Pipe*.)

The Diameter of the Bore, as well of the *Sucking-Pipe G*, as of the *Force-Pipe L*, is three Inches; and of the *Steam-Pipe D* about an Inch.

The *Receiver* holds thirteen Gallons of Water, and the *Boiler* three times that Quantity.

When this *Engine* begins to work, you may raise four of the *Receivers* full of Water in one Minute, which is fifty two Gallons; and at that rate, in an Hour's time may be flung up three thousand one hundred and twenty Gallons, which is above eighty six Barrels: Or if there were two *Receivers*, one to suck, while the other discharged it self, as has been practised, then we might raise six thousand two hundred and forty Gallons in the same time.

The prime Cost of such an *Engine* is about fifty Pounds; and the quantity of *Coal* requir'd for each Working is about half a Peck; so that the Expence will be very inconsiderable, in comparison to what the Carriage of Water upon Horses would amount to, and in such Countries where Wood is plenty, the Expence would be much less.

Now

Now if the quantity of Water, which is here said to rise in an Hour's time, may not be thought enough for the Use design'd, the same *Engine* may either be continued to work for four or five Hours, or another of a larger Extent might be set up. I have seen one with two *Receivers*, which held each of them a Barrel (*i. e.*) thirty six Gallons of Water, which would furnish so great a Quantity, that even some tollerable large Fountains might be supply'd by it.

In the working this *Engine* we may observe two things which contribute to explain the Motion of the *Sap* in *Plants*; *First*, We discover the violent Elasticity of *Steam* or *Vapour*, when compress'd or crouded into a little room, as the *Steam* or *Vapour* rising from the Roots of *Plants* into the fine *Tubes* or *Vessels* in the Wood, has sufficient force to *unroll* or *explain* them at their Extremities, and by that means to enlarge the Plant. *2dly*, We may observe the Effect of cooling this *Steam*, it then *condences* or *thickens* into Water which I suppose it does in *Plants*, as soon as it reaches their extream Parts and meets the Cold, and then returns to the Root thro' other Passages big enough to receive it, by means of its own Weight.

The *Persian-Wheel* is another *Engine* which will draw Water from any great Depth: It is much used in *Italy* and other Parts of *Europe* for drawing Water out of
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deep *Wells* and *Mines*. This *Wheel* has a Chain of Buckets, which in the time of working are continually filling and emptying themselves: Some of them going down while the others are coming up, the Chain being loose like that upon the Wheel of a *Jack*. This I should further explain, if it was not so generally known to every one that has been abroad.

As for other Inventions for the same purpose of raising Water, I shall refer my Reader to the *Engines* themselves, that at *Windsor-Castle*, the *Engine* at *Hampton-Court*, but above all others that I have yet heard of for ingenious Contrivance, the *Engine* belonging to ——— *Louder, Esq;* of *Whitehaven*, which I am told is a considerable Improvement upon *Mr. Savory's* Invention.

When by the assistance of any of these, or other *Engines*, the Water is brought up to the Place design'd, it should be exposed to the Air as much as can be in a Pond, or other Receptacle of the like nature, which is capable of containing a large Fund of Water, by which means it will be kept from fermenting so quickly as it would do in small Quantities, confin'd in *Cisterns* of *Lead* or *Wood*; and if it should then happen that the Water is not palatable, or very fit for Household Use, it may be remedied by some of the following ways.

If

If it be muddy, or ill-tasted, the Water immediately falling from the Pipe of the *Engine* into the *Pond* or *Receiver*, should first light upon a Bed of *Pebble-Stones*, three or four Foot thick; and the *Pond* or *Bason* it is received into, after it is prepared to hold Water, should be cover'd at the Bottom with the same kind of Stone. In that part of the the *Pond* where the Pipes receive the Water for its Conveyance to the House, should be laid a Heap of the same Stones over the Mouth of the Pipe; and at convenient Distances in the Course of the Pipes from the *Pond* to the House, should be made two or three small *Cisterns*, sunk a Yard in the Ground below the Pipe, fill'd with the same sort of Pebbles, and this Method will purifie the Water to an extraordinary Fineness. The famous *Pisa* Water, so noted in *Italy*, is not without these Helps; but indeed it is observable, that the very Mountain it springs from produces those *Olives* which make the sweetest *Oil* in the World, which probably proceeds from the Nature of the Soil, as the Goodness of the Water also is partly owing to.

But for want of these Conveniencies, we may refine Water another way, as it is frequently practised in *Spain*: They filter it thro' several *Bells* or *Basons*, made of a porous Stone of that Country, somewhat like those dug about *Oxford*. These *Basons* are placed one over another, as in *Fig. II.*

Plate II. sometimes five or six, to make the Water as fine as you desire; but for want of these, I think we might use large Basons of some sort of Earthen-ware made in *England*, and baked without glazing, which will let the Water pass as freely as the *Bells of Stone*.

If it is too harsh, soften it with *Chalk* and *Gravel*; but above all we must observe, that no Water-Fowl be suffer'd to come near it, nor any Weeds or Fish live in it; and also that it is not annoy'd by Leaves of Trees falling into it.

And these Directions, I think, are not contrary to Reason, if we consider that the best and the worst Waters are only good or bad, according as they are filter'd thro' *Beds* of different kinds of Earth; all Waters certainly partaking of the Qualities of the Earths they pass thorow, as it were by Infusion: It would therefore be well to observe what Soils the best or most pleasant tasted Springs run thorow, that others may be regulated by them: From such Observations an ingenious Man might easily alter the Taste and Quality of any Water according to his own Fancy.

But for the Use of *Gardens*, the most pleasant clear Water is not to be prefer'd, nor such as comes immediately from a cold Spring; neither should it be harsh, but rather soft and muddy: A stagnating Water,
that

that lies well expos'd to the Sun, seems to be the best for the Health of any Plant; or pure Rain Water, if it can be had without any Mixture; for all enriched or fatned Water, with Dungs or other forcing Ingredients, proves often fatal to Plants, if not rightly understood; and at the best can only contribute to make a Plant grow something the quicker; and such forcing of Nature always proves of ill Consequence as well to Plants as to Animals, by shortning their Lives.

Indeed where we have to do only with annual *Plants*, it may be of service to use sometimes these Provocatives, the better to bring them to Perfection within the compass of our *Summer*; but then they must be apply'd considerately, and a right Kind of Mixture prepared for each respective sort of Plant; For we must not imagine, that one sort of Mixture, however fatning it may be, will alike contribute to the Welfare of every sort of Plant. I have experienc'd, that the black Water taken from a Dunghil will make a *Cabbage*, or any of that Race, prosper extreamly: But having used the same Water to other Plants that were aromatick, and whose Texture of Parts was more close, such as *Mirtles*, *Thyme*, and the like, it kill'd them very quickly; which shews that the *Gardeners* ought not to confide in the Richness of any one particular kind of

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Water

Water for the Welfare of every sort of Plant, no more than a skilful Physician will prescribe always the same Medicine for the Cure of all sorts of Distempers.

But there is another thing to be consider'd in the preparing of Waters for Plants, which as yet seems to be very little regarded ; and that is, when we mix *Pidgeons*-Dung, or other other such like Ingredients in Waters, we must allow them due time to ferment before we use them, otherwise they will injure the Roots we water with them, and that will distemper the Plants, and it may be kill them, as we often find by Experience.

Mr. *Evelyn* very justly observes, speaking of these Mixtures, that they should not be used 'till they be sufficiently sweetned and purged from their over *Acrimony* : I have known many Plants destroy'd by the Use of unripe Mixtures, altho' the same Preparations, when they have been fully matured, have done Wonders in forwarding the Growth of the same kinds of Plants : And again, the Proportions of every Ingredient ought to be as reasonably considered, and not to double our Quantities over hastily, because a moderate Proportion has already began to shew its good Effects ; like some unthinking People, who believe that the more Physick they take, the more healthful they shall be, because they have once been reliev'd from Sicknes
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by a small Dose of it : But a few Observations to an ingenious Man, who loves a *Garden*, will soon bring him to rights in these Matters.

I find that for *Orange-Trees*, *Sheeps* or *Deers-Dung* steep'd in Water, about half a Bushel to a Hoghead, is of great Use, and may be fill'd up five or six times without renewing the Dung ; but this Water must not be used 'till it has stood at least three Days in the Sun for the first time, and about forty eight Hours for the others : And besides, we must likewise be sure to observe, that when we have once began to make use of it, it must constantly be continued, or the *Trees* will decline.

I confess I cannot from Experience direct any other prepar'd Water for the Welfare of any particular kind of Plant but the *Orange-Tree* ; but so far as I can judge, those Plants with the largest Vessels, will best endure the fattest Waters : See the Mixtures I mention for forcing Vegetation in the third Chapter of my First Part of this Work, and infuse them in Water for trial.

But to return to plain Water, which is the most natural to Plants, use only such, if possible, as has stood in the Sun some Days to soften, either in *Cisterns*, or Pits dug in the Ground, but I esteem Pits to be the best ; and even Water of this Kind should not be unheedingly given to Plants. We should

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consider the most proper Seasons of doing it, and the best Method of refreshing Plants with it.

First then, we ought to water all Plants in the Morning, in such Seasons when the Nights are frosty; and in the Evening in the warm Seasons: The Reason of the first is, that too much Wet lying about the Roots of Plants, chills and pinches them so much, if it happens to freeze, that they often perish; but if it be given in the Morning when there is likelihood of a warm Day, it gives the Plants such Nourishment as they require from it, and is dried up before the Frost of the Evening can have power over it; therefore Morning-Waterings should be in *August, September and October, March, April,* and the first fifteen Days in *May*; and from that time to the middle of *August* chuse the Evenings for the same Work, because then the extream Heat of the Sun would over-heat the Water given in the Morning to the Plants, and scald their Roots, besides drying it up too quick, before the Plants could receive due Nourishment from it: But we should never use these Evening-Waterings after the Sun is down, without great Necessity.

But in either of these Waterings, we should take care to water as near the Ground as can be, and not hold the *Watering-Pot* too high, for that would wash the Earth from about the
Roots

Roots of the Plants, and contribute to make the Ground hard when the Sun comes to shine upon it, and so bind the Roots too much. Before you water, observe always that the Earth be open and loose about the Roots; and above all, avoid as much as can be the wetting of the Leaves; for if the Frost comes upon them before they dry, it pinches and rots them; and if the Sun shines hot upon 'em while they are wet, they will spot and change their Colour.

Besides these Simple Waterings, *Colly-Flowers*, *Cucumbers*, and those Plants which have large Vessels, should be floated, that is, the *Alleys* between the Rows should be damm'd up at each End, and fill'd with Water; and one of these Floatings will do more good than six Waterings close to their *Stems*; they feed and nourish the extream *Fibres*, which alone want this help, and put the Earth in that Condition, that the smallest Warmth of the Sun will evaporate that Steam from it, which I account to be so necessary to plump the Parenchymous Parts of the Leaves and Stalks.

It is a Rule to be observ'd in the watering of Plants, That while they are not growing they should be kept as dry as possible, and at the time of their Growth they should never want Water, giving them frequently a little at a time, and chiefly at the time they are in Blossom; for if by accident of

Wet-

Weather the Water lies long about the Roots of Plants, it chills them, and checks their Growth. It is also to be observ'd, that such Plants as are very succulent or juicy, as *House-leeks*, &c. must have little Water; they contain Moisture enough in themselves for their Nourishment, and feed chiefly upon the Air, which they imbibe and condense in their spongy Parts, and besides for their Substance they have fewer *Sap-Vessels* than any other Kinds of Plants; therefore I have laid it down as a Rule in my *History of Succulent Plants*; and 'tis from Experience, that the more succulent is any Plant, so does it require less Water; and so those Plants that have the greatest Proportion of *Sap-Vessels*, and the least of spongy Parts, require frequent Waterings, which we find to be true from common Experience in the Garden, and by examining the Structure of *Water-Plants*, such as *Willows*, &c. which are for the most part composed of *Sap-Vessels*, and are therefore so tough that they may be wrought into any Figure without breaking; but all juicy Plants are brittle for want of these Vessels.

I believe if we were to examine with the *Microscope* the Numbers and Sizes of the *Sap-Vessels* in every sort of Plant we have a mind to propagate, we might come to a Certainty of the Proportion of Moisture every Plant requir'd.

Since

Since I have now given my Remarks upon *Water*, and the manner of using it in *Gardens*, I believe it will not be unacceptable to the Curious, if I give them an Account of the Method I have used to propagate *Water-Plants* in *Pots* and *Cases*, which hitherto I believe has not been practised in *England* by any but my self, and is what I find to succeed very well.



CHAP. IX.

Of *WATER-PLANTS*, whether Dome-
mestick or Foreign, the Manner of Pro-
pagating them in our Gardens.

IN the First Part of this Work I have taken some short Notice, that we have *Terrene* Plants, *Amphibious* Plants, and *Aquaticks*; but I shall now be more particular concerning the latter, and endeavour to shew how far the right Disposition of each of them ought to be consider'd when we are about to propagate them. I am perswaded, many curious Persons would have made Plantations of *Water-Plants* in their *Gardens* long since, if they had known how to have done it, as the beautiful *Flowers* of some of them at least equal, if not surpass many of our
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most

most curious *Land-Plants*, and that chiefly in the *West-Indies*; altho' *England* has also its Share, witness the *Water-Lillies* and *Ranunculus's* of different Kinds, so frequently found in our *Rivers* and *Ponds*.

Now that *Water-Plants* may have their place in *Gardens*, even altho' there are neither *Ponds*, *Rivers* or *Springs* to plant them in, I shall recommend the following Method, which I have experienc'd with good Success. First, provide either large *Garden-Pots* glazed within side, and without Holes in their Bottoms, or else cause some Troughs or Cases of Wood to be made according to the third *Figure*, *Plate II.* of *Oaken Boards*, about two Inches thick; such Cases should be six Foot long, two Foot wide at the Bottoms, and two Foot and a half deep, if they are for large *Plants* that grow under Water, or shallower for such as do not require deep Waters; the Corners and other Joints of such Cases should be strengthen'd with Iron, the Insides well pitch'd, and the Outsides painted. In these *Pots* or *Cases* put common unmix'd Earth, so much as to fill one third Part of them, for *Water-Lillies*, *Pond-Weeds*, or such others as require depth of Water for their Leaves and Branches to swim in, and fill about two Thirds of them with the like Earth for *Water-Plantains*, *Water-Aroms*, and *Ranunculus's*, which love less depth of Water than

than the former; then for those *Plants* which grow in *Marshes* and *Bogs*, the Earth may lie within five Inches of the Top. This Work may be done in *April*, when the *Water-Plants* begin to appear, which may be brought in and planted from that time till the middle of *June*, filling up each *Pot* or *Case* with Water as soon as the *Plants* are put in them. It must be observ'd likewise, that many of the *Water-Plants* are *Wanderers*, without taking any Root in the Earth; such are the *Water-Soldiers*, *Frog-Bits*, and *Ducks-Meat*, which swim about from place to place, as the Wind carries them, and only strike their Roots into the Water; therefore a small quantity of Earth at the Bottoms of the *Pots* they are set in will suffice to maintain the Water in a right State for their Support. In a word, to observe the Mode of Growth, and the Exposure of those *Plants* we collect, will best help us to understand the right way of Cultivating them with Success, when we are about to civilize them in our *Gardens*; where in all things the plain Road of Nature should be follow'd, or at least kept in view, if we desire healthful *Plants*.

I find that in this artificial Management of *Water-Plants*, those of *Rivers* should be frequently refresh'd with Spring-Water, and such as delight to grow in standing *Pools* or *Ponds*, to be seldom interrupted with it. It

is also observable, that *Water-Plants*, upon removing them, will be as long before they recover themselves to renew their Growth as *Land-Plants*, which may seem strange to some who are used to see the sudden Refreshment of a decay'd *Land-Flower* when it is put into Water. And whereas it is a common thing to shelter *Land-Plants* from the Heat of the Sun after transplanting, *Water-Plants* must be dealt with directly contrary, and be expos'd to the Sun after they are removed.

The *Seeds* of *Water-Plants* are of two Kinds, one Class always swimming on the top of the Water, and the other sinking to the bottom as soon as it is shed, following the Nature of their Mother Plants in that respect: For if the *Seeds* of those Plants, which naturally swim on the top of the Waters should sink to the bottom, such *Seeds* would then be removed from the proper Station requir'd for their Growth, and would therefore perish: And so likewise the *Seeds* of those Plants, which Nature directs to grow under the Water, will not swim on the top of it. We may take notice that Providence has so wisely order'd, that in our Climate not any *Water-Plant* is ever green, but that they are all of them either Vivacious or Annual, losing their Leaves down to their Roots, or else perishing entirely, their *Seeds* only excepted; for there is no Probability

bility of their living and growing in the frozen Waters; and it is therefore the more necessary I should say something concerning the Preservation of their Seeds, to supply us with the several Kinds from Year to Year, which without doubt will produce as many Varieties as the Seeds of Land-Plants do every Year; and besides; the Method which I shall prescribe for the preserving the Seeds of *Aquatick Plants*, may be useful for the transporting of them from remote Parts, or foreign Countries, which may be done more easily in Seeds than in Plants already grown.

In order to save the *Seeds* of these *Plants*, we have no more to do than to follow them from the Flower 'till they are ripe, and then to put them in Earth and Water to preserve them for Vegetation the Spring following, for Nature takes that way, and in this there is no difficulty. The *Pots* and *Cases* I have already directed, are proper to put them in as soon as they are gather'd; then let them sink or swim in the Water 'till the Spring causes them to sprout, they will prosper with little attendance; but indeed if we can be happy enough to meet with an ingenious Correspondent in any Part of *America*, where the Waters so generally are adorn'd with beautiful *Plants*, we must contrive some particular Method to preserve them during their Transportation; and for their Culture

when we receive 'em, such as putting them (each sort by it self) in Bottles of Water and Earth, with large Mouths, cover'd only with Linnen-Cloth, and not with Corks, which would cause a Ferment in the Liquors: Place those Bottles in some Vessel of Water 'till they can be brought to us, and then sow them in the Pots, prepared as I have already directed for *Plants* of this nature, and place them in *Hot Beds* 'till the Weather with us will nearly answer the Heat of the Climate they came from. At the gathering their *Seeds*, strict Observation should be made of the depth of Water they grow in, the Situation, the Quality of the Soil under the Water, and whether they inhabit running or standing Waters; and above all, the Taste of the Waters they grow in, whether salt, brackish, or fresh, should be observ'd; by such Instructions I think it will be impossible to fail of the Success we desire.

When we have collected a sufficient Variety of *Water-Plants* into our *Gardens*, we may prepare to dispose them in *Classes*, and range the several Tribes in proper Order, which would be very useful to such as read *Lectures* on *Plants*; for indeed the want of some such way as this for the Cultivating of *Aquaticks* in a narrow compass of Ground, has given the Students in *Botany* the greatest Trouble in their Studies, and has been the Occasion that *Water-Plants* are so little known. The

The most proper Season for disposing and removing them is as soon as they are out of Flower, and the Leaves begin decay, which is about the beginning of *September*; their *Stems* or *Branches* must then be cut off near the Root, and their Roots planted at due Distances in the *Pots* or *Cases* already described.

The *Water-Lillies*, which I so much commend for their Beauty, are of several Kinds; the *Double White*, the *Single White*, and the large *Single Yellow* flowering Sort, which bears a Fruit as large as a *Tennis-Ball*: And beside these, I have heard of smaller Sorts of them in *England*, but have not yet found them; the large Kinds blossom in *June* and *July*; that with the *Yellow* Flower somewhat sooner than the others: We may find them in quiet Waters, as in a *Pond* at the Back of *Twittenham*, where I have gather'd three Sorts, but the *Yellow* Sort especially is very plentiful in the River of *Thames* about *Brentford*, where there are many other pretty sorts of *Water-Plants*.

In the Ditches about *Lambeth*, and near the *Neat-Houses*, *Westminster*, I have observ'd great Varieties; as also near *Hamsted*, and upon the Banks of the *Thames* over against *Greenwich*; but I am told there are not in any place in *England* so many different Species as in *Cambridgeshire*, which abounds so much in curious *Plants*, that the

Famous Mr. Ray thought it worth his while to compose a Volume on purpose to describe the Plants of that Country only. So that such as covet to propagate *Water-Plants* may easily stock themselves with Varieties enough, which I shall never believe are less useful or beautiful, because they are not so highly prized as many others.

I shall now say little more upon this Head, unless it be that we must shelter such *Water-Plants* as we receive from foreign Parts, in the *Green-House*, during the *Winter*; for it may be in that Season they will flower with us; if they, like the *Exotick Land-Plants*, preserve so far their natural Season of Growth, that they will only sprout in the Spring-time of their Native Countries. During their Confinement in the House, they must be often refresh'd with Water, somewhat warm'd by the Heat of *Horse-Dung*, or the *Sun*, and allow'd as much Air as possible.





OF THE
GREEN-HOUSE,
 AND
Exotick Plants.

CHAP. I.

Of the GREEN-HOUSE, or CONSERVATORY; with Directions for Sowing Exotick Seeds, and the best Method of Gathering them abroad for Transportation, and the Manner of Packing them up.



AS there is nothing more difficult in the Management of *Exotick Plants* than the right understanding of the *Conservatory*, where they are to stand in the *Winter*, so I think it necessary in this Chapter to prescribe such Rules for the building and ordering of *Green-Houses*.

Houses, as I have found to forward the Welfare of *Plants*, and as yet has been but little regarded or understood.

The *Green-Houses*, as they are commonly built, serve more for Ornament than Use; their Situation to receive the *South Sun*, is the only thing that seems to be regarded towards the Health of the *Plants* they are to shelter: It is rare to find one among them that will keep a *Plant* well in the *Winter*, either by reason of their Situation in moist places, their want of *Glasses* enough in the Front, the Disproportion of the Room within them; and sometimes where it happens that a *Green-House* has been well consider'd in these Points, all is confounded by the *Flues* under it, which convey the Heat from the *Stoves*.

From the Experience therefore that I have had in the Culture of several thousands of *Exotick Plants* in different Kinds of Conservatories, I shall venture to give my Sentiments of the Matter.

Beside what is commonly call'd a *Green-House*, it has been customary to provide *Glass-Cases* of several Kinds, and *Stoves* for the Preservation of *Plants* brought from different Countries; but I now find they are so many unnecessary Expences; a good *Green-House*, well contriv'd, will do all that is requir'd for the Welfare of any *Plant* in the *Winter*: It may be so ordered, as to shelter
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at one time *Orange-Trees*, *Plants* from the *Cape of Good Hope*, *Virginia*, *Carolina*, and indeed such as grow within ten Degrees of the *Line*. I must confess, when I was first acquainted with *Aloes*, *Indian-Figs*, and such like *Plants*, I thought they could never have Heat enough, and destroy'd many by that too common Notion: I could hardly venture them out of *Hot Beds* in the most extream Heats of the *Summer*; and in the *Winter* they were half roasted with subterraneous Fires I had made under the *Glass-Cases* where they stood.

But the great Inconveniencies I found by that Practice, put me upon making other Trials; I was soon convinc'd they would live in the open Air in the *Summer*; and I found that by bringing them acquainted with it in that Season, they became more hardy to resist the Cold of the *Winter*; they were then vigorous and healthful; and I had no more to do in the most rigorous Seasons, but to keep them from the Frosts, and so to dispose the *Conservatory*, that when they came to be shut up in severe Weather, there might be Air enough enclos'd in the House to circulate freely about the *Plants*, and dry up those Damps which are at such times apt to rise from the Moisture of the Pots of Earth; for those Damps I found commonly had the worst Effects upon *Plants*, by bringing Moldiness upon their Leaves or Stalks,

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which

which always rotted 'em unless timely prevented. To correct these, as well as prevent the Frosts from getting into the House in very violent Seasons, I made use of a little *Charcole Fire*; after it burnt clear and had done smoaking, which I hung up between the Windows and the Plants. One of these Fires would keep the Air in the House warm and dry for about twenty four Hours, without renewing; and this Method I found had a much better Effect upon the *Plants* than the subterraneous *Fires*, which commonly rais'd Damps, crack'd the Passages of the *Flues* where it run, and often fill'd the House with Smoak, which is a great Enemy to *Plants*, especially the Smoak of the *Sea-Cole*.

Now altho' I found so much Benefit by *Charcole Fires*, that the last hard *Winter* I did not loose one *Plant*; yet even those Fires are not without their Inconveniencies; where there are many of them, they are so suffocating that several Men have been choak'd by them, upon going into the Places where they have been burning; and if they be not made to burn clear before they are put into a House, the Sparks will fly in such great Numbers from the burning Coals, that the House would be in danger from them of being set on Fire.

These Inconveniencies indeed are enough to lessen our Esteem for *Charcole Fires*; but
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it depends upon the Care of the *Gardener* that he avoids those Dangers, by putting into his *Green-House* only a small Fire or two, in Proportion to the bigness of the House, and by taking care when he puts them in, that they are rather declining than increasing in their Heat.

Since I have seen some of the new invented *Chimneys* so judiciously improv'd by my Learned and Ingenious Friend Mr. *Disaguiers*, F. R. S. I am of Opinion, that nothing can be contriv'd more for our purpose of preserving Plants in the *Winter* from Frosts and Damps, than one of them placed artificially in some part of a *Green-House*; they will afford us all that we can desire from any artificial Heat, for the Welfare of *Exotick Plants*, without any Inconvenience attending them; and neither the Trouble or Expence of Firing will be near so great as in the preparing of the other Fires I have mention'd; and the Expence perhaps not exceed the Charge some have been at in making and continually repairing *Stoves*, which are frequently out of order, besides the double Advantage we may have from one of them, by setting it up in some Room joining to the *Green-House*, where altho' a Fire may be kept constantly, yet the Heat may be let into, or kept out of the *Green-House* at pleasure; and that in such Proportions, as to make the Air in the *Conservatory* equal
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to the Warmth of any Climate we have a mind to imitate, which we may judge of, by placing a *Thermometer* in some part of the *Green-House*: By means of this Invention, the Air in the House will be put in Motion, kept dry and warm, and correct the Damps, the House will be replenish'd with fresh Air, as we see occasion, there will be no danger of Smoak, or the Charge of frequent Repairs: So that considering all these Excellencies, I cannot conceive that any Invention can exceed this for the Preservation of *Exotick Plants* in the *Winter*. We may see a farther Account of these *Chimneys* in the Book publish'd by Mr. *Disaguliers*, call'd *Fires Improv'd*.

From hence we may judge that a good *Green-House* ought to be situated upon the driest Ground, to be as free from Damps as possible; we ought also to provide substantially for the keeping out of Cold, and yet upon occasion to let in Air freely, but chiefly to contrive that the Front of the House be so dispos'd, that nothing may obstruct the Passage of the Sun's Rays in the *Winter* into the House.

I suppose every one will allow, that the *South Aspect* is the best for a *Green-House*, as it will in that Exposure receive the Sun for the greatest part of the Day; but in case that cannot be had with Conveniency, the *South-West Aspect* is next to be coveted. I think

think it would be pleasant, as well as beneficial to *Plants*, if the *Conservatory* was always join'd to the Dwelling-House: Can there be any thing more agreeable in the *Winter*, than to have a view from a *Parlour* or *Study* thorow Ranges of *Orange-Trees*, and curious *Plants* of Foreign Countries, blossoming, and bearing *Fruit*, when our *Gardens* without Doors are as it were in a State of Death, and to walk among those Curiosities of Nature, as in the most temperate Climate, without any Sense of the Frost or pinching Cold that reigns abroad? And besides, there is this Convenience in the joining the *Conservatory* to the House, that in cold Weather we may go into it without letting in the cold Air, or blighting Winds from abroad, which would injure the *Plants*.

The Situation of the *Green-House* being thus fix'd upon, the Proportions of the Building must next be consider'd, and that chiefly in relation to the Height and Breadth of the Room; for the Length of a *Green-House* may be more or less, according to the Fancy of the Owner: But for the better Admission of the Sun's Rays to pass all over the House, the Breadth of it should not be more than the Height from the Floor to the Ceiling, which may be from ten to eighteen Foot.

I

The

The Walls towards the *North* and the *East* must be of a good thickness, but the Front towards the *South* should be all of *Glass*, excepting a low Wall about a Foot high from the Ground; there ought to be no Peers of Brick-work or Timbers in the glazed Part, for they cast more Shade into the House, in Proportion to their Bigness, than it can receive Light thorow the *Glass*; and every one that understands *Exotick Plants*, I'm sure will allow that they should have all the Advantage of the Sun's Rays in the *Winter* that they can possibly receive; and for this End it would be useful in the colder Parts of *England* to build the Front of the *Green-House* in a Sweep, after the Fashion of a Semi-circle, which would then receive the Rays of the Sun from the Time of its rising, 'till it sets.

The *Glass* in the Front, whether it be in *Sashes* or *Casements*, must be so contrived, that it may either be made to slide quite below or above the Frames, or to be taken away as there is occasion to give Air to the *Plants*, which for about a Fortnight or three Weeks after they are set into the House, and as long before the *Plants* come abroad should be quite open Night and Day, if the Frosts or blighting Winds are not abroad; but at other times, while the *Plants* are within Doors, all the *Glass* should be put up, and only open'd with Discretion in the Day-time

time to air the *Plants* : The *Sashes* or *Casements* being open'd, more or less in proportion as the Weather is cold or warm, and should be always shut close again before the Sun is off of the House, that the Air in it may keep warm 'till the next Day. Some have practis'd with good Success to lay the Windows of their *Conservatories* sloping about ten Inches; but as far as I have experienced, they will do as well upright. The Door should be in the middle of the Front, and at least four Foot wide, to admit large *Plants*; it should be glazed like the Windows.

To these we must provide strong Shutters, at least an Inch thick, which in the *Winter* time should be shut every Night for fear of Frosts, and also in extraordinary cold Weather, when violent Winds blow right against the House.

For the better Security of the *Plants* from Cold, a Place for the laying up the *Gardener's* Tools may be built at the Back of the *Green-House*, and over it a *Fruiterie*, or *Seed-Room*; or in the lieu of the latter, fill the Roof full of dry Straw.

The best *Pavement* is that made with square *Tiles*, which sucks up Wet quickly, and never sweats as *Marble*, or such Kinds of hard Stone usually does: And for the Lining of the Walls, nothing is preferable to the *Dutch Glazed Tiles*, which are soon warm'd with
the

the Sun, and reflect a great Heat into the House.

A *Green-House* being built answerable to these Directions, after it is well dry'd may receive Plants into it; but nothing injures them more than to set them into a damp House. In the placing them in the House, we must observe the following Particulars.

It is commonly practised to provide Rows of Shelves placed one higher than the other, from the *East* to the *West* End of the House; these should be made to hold as many Pots with Plants as will fill up about one fourth of the Space in the House, leaving the rest for Air to circulate about the *Plants* when they come to be shut up close in frosty Weather: For if the House was to be crowded with *Plants* in the *Winter*, their too great Numbers would create Damps, by condensing the Air in the House; but a quantity of *Plants* proportionable to the space of the House, as I have already hinted, cannot over-power the Air in it, so far as to produce those Damps. It is observable, that in Countries which abound in Wood, great Rains are very frequent, which seems to inform us, that the cold Nature of the many Trees there growing, and also the coldness of the Earth under the Trees condense the Air, and by that means breed Rain more than other places that are not over burden'd with Woods.

In the disposing of the Shelves in the *Green-House*, I allow one Third of the Floor

Floor for them to stand upon; one Third from the first Shelf to the Windows, and as much from the last Shelf to the Back of the House; so that we may walk round the *Plants*, which being placed in the middle Line of the House, are safe from the extrem Cold, which is generally nearer the Walls or Glasses.

Between the Windows and the first Shelf, at one End of the House, should be built the *Chimney* for warming the Air, and the Heat made to come from it into the House, about a Foot above the Floor, which will rise afterwards, and spread it self over the Whole. Near the Place where this Heat comes in, place the most tender *Plants*; and by degrees, at greater distance from it, the most hardy. We may best judge of the Nature and Temper of *Plants*, by consulting what Climates they were brought from; as for example, those which come from Countries near the *Line*, must have the warmest place; if they grow on this side the *Line*, their Spring begins about the same time with ours; but if they were brought from the *South-Side* of the *Line*, then their Spring begins about *August*. All *Plants* of the *Cape of Good-Hope*, and other Parts beyond the *Line*, such as *Aloes* of those Countries, *Ficoides*, and such like, flourish most with us from *August* 'till the End of *November*, 'till the Cold of our *Winter* checks their Growth.

All

All seedling *Plants* from hot Countries, which we raise in the Spring upon *Hot Beds*, should be used to the Air as much as possible when they are once come up, for else they will hardly stand the *Winter*, tho' they are set in the warmest part of the *Green-House*; but there will be little danger of losing any of them after they have been preserved twelve Months, and have had the Trial of all our Seasons.

I observe that the *Plants* which I have raised from *Seeds* brought from *Jamaica*, *Barbadoes*, *St. Christophers*, and from others of the *Caribbe-Islands*, are the most tender, and hard to be kept: But I am perswaded a House built after the manner I have directed, with the Addition of one of the *Chimneys* I mention, would keep them, or any other, with very little Trouble.

Plants from *China* are indifferently hardy, as well as those from *Persia*; and I find that most of those brought us from the *North* of *Carolina* and *Virginia*, whose Seasons are but a little earlier than ours, and the difference of Latitude not more than twenty five Degrees *South* from *London*, may be naturalized without Difficulty to our Climate, after they have been shelter'd for two or three *Winters* with us; witness that Wilderness of *Exotick Plants*, which that Wise Encourager of Natural Learning, the late Bishop of

of *London*, caused to be planted in his *Gardens* at *Fulham*, and have prosper'd so well without Shelter for several Years.

The Time for setting *Exotick Plants* into the House is about the second Week in *September*; and the middle of *May*, if the Frosts are pass'd, they are commonly brought out of the House: But altho' this is become a general Rule (in a manner) among the *Gardeners*, we must yet take this Caution with us, that all Plants are not alike tender; *Orange-Trees*, and most Plants of *Virginia* and *Carolina* are indeed rightly set in and out of the *Green-House* at those times; but *Myrtles* may come abroad sooner by fifteen Days, and remain out of Doors 'till the middle of *October*. Again, *Aloes* should not be brought out of the House 'till the first Week in *June*, and set in again about the last Week of *August*; and such Plants as live nearest the *Line* should yet be more confin'd to the House than any I have yet mention'd: But concerning the Housing and Bringing abroad of all sorts of *Exotick Plants*, we must be sure to observe this General Rule, *i. e.* that they must be perfectly free from Wet on their Leaves and Branches when they are set into the House; and we must always bring them abroad, if possible, with the Advantage of a gentle Shower, to wash and refresh their *Leaves*.

It next follows that I describe the Manner of raising *Exotick Plants* from *Seeds*, and that should be done in this manner; When by Means of Correspondents in Foreign Countries, or the help of Curious Persons at Home, who have by their Industry collected the *Seeds* of Foreign Novelties, we are provided with a Collection of *Seeds* from any hot Country, we must presently prepare a *Hot Bed* for them; and while it is settling it self for Use, sow the *Seeds* in *Pots* separately, marking every Sort, that when they begin to come up, we may the better know what we are to expect. When they have made their first *Leaves*, plant them out in other *Pots*, and give them a fresh *Bed*, when the first is cool, and as soon as the second begins to decay, use them to the Air in the Day-time to harden them for the *Winter*: If by chance all the *Seeds* we sow do not come up, keep the *Pots* they were sown in 'till the Spring following in the *Green-House*; for many *Seeds* will lie in the Ground 'till the second Year without sprouting, as I have often found, and they always prove to be *Trees*.

And that we may with the more certainty propagate such *Exotick Plants* from *Seeds*, I think it may not be amiss to consider the most proper Method of Gathering them in Foreign Countries, and Packing them up for Transportation, that what *Seeds* we receive

ceive from Abroad may not lose their *Germi-*
native Faculty before they come to us, or
 be destroy'd by *Insects*, which often hap-
 pens.

I would advise then, that all *Seeds* gather-
 ed abroad, which are design'd for Transpor-
 tation, but especially if they are to under-
 go a long Voyage, should be cut from the
Plant, with part of the *Branch* they grow
 upon, a little before they are going to shed
 or drop from the *Plants*, and in that Manner
 laid in the *Sun* to dry thorowly before we
 offer to pack them up, for the least Moisture
 will rot the *Seeds*: All *Beans*, *Pease*, and
Coddled Fruits should remain in their *Seed-*
Vessels, which will afford them some Nou-
 rishment, and preserve them from the Injury
 of the *Sea Air*, which is pernicious to
Land-Plants. *Fruits*, such as have a *Pulp*
 or *Flesh* over their *Seed*, should be dry'd, if
 possible, with their *Flesh*, and the *Stalk* or
Part of the *Branch* they grew upon adhering
 to them; for Nature has provided proper
Coverings for every *Seed* to defend it from
Injuries, and for its Nourishment, 'till it is
 fit for the *Ground*: At the Gathering of
 every *Seed*, Notice should be taken of the
Soil, and the *Situation*, whether *Sand*,
Loam, *Clay* or *Rocky*; the *Side* or *Top* of
 a *Hill*, whether *Boggy-Ground*, either ex-
 pos'd to the *Sun*, or in *shady places*, if un-
 der *Trees*, or in *Plains*; this is so very ma-
 terial,

terial, that I know some *Plants* will not grow any where but in Woods, and there only under particular Kinds of Trees, as some of the *Orchis* Kinds for example, which I have often try'd to propagate in my *Garden* to little purpose. When a sufficient Collection of *Seeds* is gather'd, and well dry'd, put each Sort by it self into Paper, with its Description, Time of Flowering, the common Names they bear among the Country People, and the Use they make of each Kind; then put the Papers close together into Glas-Vessels, or Stone or Earthen Pots well glazed, and stop'd down close, with Pitch or Rozin melted over the Corks or Stopples: These being so order'd, should be put into a Box, filling up the Spaces between them with dry Sand; and then after the Box is well secured, set it in some dry place of the Ship.

The smallest Kinds of *Seeds*, and such as are of the least Substance, should be put into dry Sand, in separate Parcels, according to their Kinds, for otherwise they would shrink for want of Air, which they should, as much as possible, be debarr'd from while they are upon the Sea. All bulbous Roots should be taken out of the Ground when their Flower-Stalks begin to decay; and when they are well dry'd may be pack'd up with dry Sand in Glas or Stone Vessels.

But

But if it could be compass'd to send over *Plants* already growing, plant them four or five Inches asunder in Boxes, having first pruned off their Branches; between them plant the bulbous Roots, and over the whole sprinkle some *Seeds* of the smallest Kinds, and then make a Cover of Hoops or Lattice-Work to put over the Box, which will defend the *Plants*, while they are at Sea, from the *Rats*, and give a free Passage for the Air and Sun to come at the *Plants*. And to be yet more certain of their Welfare, an outside Case of Boards, nail'd close together, may be made to put over the Box in hard Weather, to defend the *Plants* from the Sea-Water: These Boxes should not be very deep, least they hold the Wet too long about the Roots of the *Plants*: To avoid which, there should be Holes at the Bottom for the free Passage of the Water, which the *Plants* should have in small Quantities when the Earth began to dry, which perhaps may be in twenty four Hours in some Climates, and not in three or four Days in others. *Plants* pack'd in this manner should stand upon *Deck* if possible.

Thus having laid down the General Rules for the Ordering of a *Green-House*, and the *Plants* to be shelter'd in it, I shall in the next place proceed to give particular Directions for the *Culture* of such Kinds of *Exotick Plants* as merit the most our Pains and Admiration.



C H A P. II.

Of ORANGE and LEMON-TREES,
and their Culture.

HERE is little difference in the manner of ordering the *Orange* and *Lemon-Tree*; and seeing that these Kinds of *Plants* are so beautiful in every respect as to merit an universal Esteem, I shall therefore be more curious to lay down such Rules for their Management, as may every way contribute to their Improvement; and first of *Orange* Stocks, which are brought from *Genoa* and other Foreign Parts.

The most proper Season for the Importation of *Orange* Stocks into *England* is in *February*; so that at least there should be a Fortnight in that Month to prepare them for Growth, that their Shoots may be vigorous and strong the succeeding Summer. When we receive them from Abroad they have very little Root, and less Branches; and as they have commonly been laid up in that Condition in dry Boxes for some time before we

receive them, they require no small Care to recover them from their Lethargy. I first advise that they be laid upon wet Moss, in some large Room, where they may have the Advantage of as much Air from abroad as may be (provided it be not too sharp) in the Day-time only for about a Week; this Method, if they are turn'd once in twelve Hours, will recover their shrunk Vessels, and swell their Bark; then their Roots must be examin'd, and their wounded and dead Parts cut off with a very sharp Knife; and of the Earth about them, if they have any, very little taken away; their small remaining Tops must likewise be prun'd off, leaving only such Shoots as are vigorous about three or four Inches long, and all the Wounds of them closely plaister'd over with soft Wax: In this State their Roots must be laid in River or Pond Water for about twelve Hours, and set to drain for about half an Hour after they are taken out, before they are planted.

The Pots for these Stocks must be just big enough to admit of two Inches thick of the following Earth on every side their Roots and no more, least the Warmth of the *Hot Bed* they are to be set into has not strength enough to reach them and make them strike, for the *Hot Bed* must be very moderate and gentle, least the Roots are scorch'd, and then it will be to little purpose ever to attempt the Recovery of the Plants.

The Earth which I have made use of with success was one third part of rotted Wood, one third of fresh sandy Loam, and as much *Melon* Earth well mix'd and sifted together; this Soil I always found to make my Trees prosper and produce excellent Fruit.

The Stocks being in this State, their Pots should be set upon a *Hot Bed* prepared as directed in *Chap. I.* of the *Kitchen Garden*, when the great Heat is past, after the whole Surface of the *Bed* is cover'd with Mold, to prevent the Steam of the Dung rising and annoying the Plants.

This *Bed* should be made under a warm Wall, and shelter'd from the cold Air with Glasse on the Sides and on the Top: The *Plants* being thus prepared for Growth, must be moderately water'd about once a Week 'till *April*; and then, if the Weather be very warm, every third Day. It is also to be observ'd, that at all such times as the Sun shines warm upon them their Tops must be shaded with *Mats*, least the tender Shoots, which begin to put forth, be scorch'd, and by that means perish.

In *May*, when their Shoots begin to show their Vigour, it will be necessary to give them Air by degrees, by opening the Glasses towards Sun-set, if the Evenings are not too cold; this, if it be done judiciously, will contribute to strengthen them, and make them

them shoot green and healthy. During the Course of their first Shoot they must be shifted every six Weeks, at least, into fresh hot Beds; but as soon as *June* is past, I would not then advise any more Forcing, but rather endeavour to prevent them from setting out a second Shoot, by exposing them at large to the open Air in some place shaded from the *Sun*, where they should remain 'till the first Week in *September*, and then carry'd into the *Green-House*; at which time, three or four Inches of the Earth on the top of their Pots should be carefully taken away, without injuring the Roots, and as much fresh Mold put in its place.

The *Orange-Trees*, being thus seated in their *Winter* Habitation, should have as much Air as possible allow'd them, Night and Day, 'till the latter End of *October*; the Windows of the *Green-House* should never be shut during that time, unless the Winds or Frosts happen to be very severe; and in the following *Winter*-Months, when the Weather is moderate, no Opportunity should be let pass of opening the House.

These *Trees*, altho' they love the Shade, yet quickly perish if they have much Water; let them be frequently refresh'd with it a little at a time, least too much Wet about their Roots chill or rot them, and destroy the *Plants*. I find that *Sheep* or *Deer* Dung, steep'd in the Water for *Orange-Trees*, contributes

tributes to make them healthy. The Effect which violent and hasty Waterings will have upon these *Trees* will be, that the Leaves turn yellow, and often drop off; and above all will remain for a Year or two languishing, without putting forth any Shoots, and at length entirely go off. Now if by these, or some better Directions, a *Gardener* maintains his new *Orange-Trees* in good Health 'till the latter End of *February*, let him then renew the Earth as he did in the fore-going Autumn, and trim the Heads of his *Plants*, leaving six Inches or thereabouts of the preceding *Summer-Shoots*, if they be strong, or less in Proportion, as they are otherways, plaistering the Wounds with soft Wax, as I have before directed; they will, after this Operation, soon begin to sprout, and make good Shoots the *Summer* following, if they are discreetly made acquainted with the External Air before they are set out of the House.

It is commonly practis'd to bring them abroad about *Mid-May*, especially if moderate Rains fall at that time: And I have known it laid down as a Rule, to set them out of the House when the Leaf of the *Mulberry-Tree* is as large as a *Crow's Foot*, which perhaps may be a certain Sign of the settled Temperature of the Air. I have indeed my self had little regard to either of these Rules, but have chiefly trusted to the

the Time of the *New Moon* in *May*, which I observe commonly brings gentle Showers, and warm Weather.

For the *Summer* Station of these *Trees*, it is advisable to provide some shady place in the *Garden*, either by fencing it in with Hedges of *Dutch Elm*, *Hornbeam*, *Holley*, or *Evergreen Oaks*, about twelve or fifteen Foot high, or else to clear some place in a *Wilderness* or *Wood* to set them in, such as may be seen at the Right Honourable the Earl of *Essex's* at *Cassioberry*, and some other Places; for in such Shelter this *Plant* delights exceedingly. With this way of Management we may expect handsome *Trees* in three Years from their first Planting, minding to change their Pots as the Roots increase in bigness; which Work is best done in *February*: And let the *Gardener* take this Advice along with it, that he always plant these *Trees* so shallow in their *Pots* or *Cases*, that none of the *Stem* be set below the Earth, but rather let some of the large Roots joining to the *Stem* be seen above it; and also that the *Pots* be not too large, for then the Roots would chill, by having too much Moisture about them.

The third *Summer* after planting the *Trees* will begin to blossom, and if they are in Health will set Fruit, which will be as big as a Musquet-Bullet when they are put into the House, and ripen the *Summer* following.

No

No skilful *Gardener* will ever covet great quantities of Blossoms, as they are certain Signs of Weakness, and a Fore-runner of Decay, unless timely prevented by pruning many of them off as soon as they begin to appear.

That Great Encourager of Ingenuity, the late King of *France*, was so great an Admirer of this *Tree*, that he continually had Rows of them flowering in a Gallery of the *Louvre*; they were placed upon *Pedestals*, with Cases of emboss'd *Silver* over their Pots. I leave my Reader to imagine the Pleasure of such Furniture, which was never wanting as well in *Winter* as in the *Summer*. The Manner of bringing the Trees to blossom at every Season was thus; after the *Gardeners* had chose a number of Trees sufficient for their Use, they let them remain without Water 'till their Leaves drop'd off; and then giving them fresh Earth on the Tops of their Pots, and frequent Waterings in a Glass-Case, they came out full of Flowers and fresh Leaves, fit for the Place they were to stand in; these they renew'd every Month throughout the Year; and the like Curiosity was also in the Palace of the Prince *di Burges* in *Rome*.

The Situation and Climate natural to this beautiful *Tree*, may be consider'd in the next place; and may somewhat help us to judge of the Temper and Nature of the Air it requires :

quires : The first Groves of them that we meet with growing wild in *Europe*, are at *Eres* near *Thoulon* in *France*, which is between forty two, and forty three *Degrees Latitude* ; and about *St. Remo*, and the *Riviera* of *Genoua* in the same *Latitude*, near the Sea, at the Foot of very high Mountains to the *North* of them ; and the first Woods of them growing in *Italy*, are as far *South* as *Gaietta* ; and so agreeable is the Air of the Sea to them, that in many Places more remote from the Sea than *Thoulon* and *Gaietta*, altho' farther *South*, they cannot be made to thrive without Shelter in the *Winter*.

The various Kinds of *Oranges* and *Lemons* would make a very considerable Article, if I was to mention each Sort in particular, and indeed would be of little Use ; I shall therefore only mention some few which are the most common in our *English* Gardens. The *Civil-Orange* is, in my Opinion, the best, as well for the Beauty of its *Leaves*, as for the Goodness of its Fruit, which will come to Maturity with us. The *China-Orange* never makes a handsome Tree, but is always inclining to look sickly, and seldom bears Fruit in Perfection. The *Curl'd Genoua Orange* is somewhat more pleasant to the Sight, but is a very slow grower : And the *Strip'd Genoua*, for the beautiful Variegations of its Leaves may well enough be introduced

as a Rarity; but for its Fruit I have never yet seen it fit for any Use.

The *Portugal Lemon*, and the *Lime*, bear good Fruit, which will ripen so well with us, that I have gather'd as good from my own Trees as any that have been brought from abroad: Some *Citrons* and *Shadocks* have by chance ripen'd in *England*, but they are hardly worth our Trouble: However, if in any Collection they happen to be found, the *Gardener* ought only to observe, that as they, and all the *Lemon Race* will grow much quicker than *Oranges*; so their Pots or Cases ought to be larger, and their Watering more frequent; to which I shall add, as a certain Rule, that Pruning their Branches must be avoided, as much as possible; for I have known several Trees spoiled by it.

Now altho' I have given Directions for the Management of large *Orange-Trees*, which are brought us from foreign Parts, and have, by means of the Method I have laid down, eat very good Fruit, which they have produced; yet I find by Experience that the *Orange-Trees* raised in *England* from Kernels, are more hardy, and will bear Fruit with more Certainty, and in much greater Quantities, with less Trouble; and therefore I shall inform my Reader of the Method which I practise to raise them from Seeds.

In

In *February* I prepare a *Hot Bed*, in which (as soon as the burning Heat is past) I place several Pots fill'd with light dry Earth, and sow the Seeds of *Oranges* and *Lemons* in them, about an Inch deep, where they will remain about ten Days before they appear above the Earth; give them little Water 'till they come up, lest you rot the Seeds; for when they are taken fresh from the Fruit, the outward Membranes, which enclose the Seeds, are always cover'd with a kind of *Mucilage*, which will remain moist for several Days, and is sufficient, with the addition of a small Heat, to make the Seeds sprout, as an Observation of the Curious *Mr. Anthony Van Leuwenboek* sufficiently proves. He says that he took a little *Copper Box*, and put some Sand into it, which for its whiteness, and because it is used to scour *Tin*, is call'd *Scouring-Sand*. He adds, this *Sand* was very dry of it self, but was somewhat moisten'd by the *Seeds* he put into it, having newly taken them out of an *Orange*; this he did in *November*, and carry'd the *Box* shut close in the Day-time in his Watch Pocket, and at Night had it put in a Vessel of hot Water, by which Means the *Box* was constantly kept warm: The sixth Day he open'd it, and found that the *Seeds* had already put forth Roots, near half an Inch in length; and from time to time, as he review'd them, found them increase and put out

out Branches. This Experiment of Mr. *Leuwenhoek* indeed was made by him for a much greater End than what I now use it for : He endeavours to prove by it, that every Part of a *Plant*, as well their *Leaves*, *Flower* and *Fruit*, as their *Roots* and *Branches*, are all contain'd in the *Seeds*; and that their Germination is only the filling and explaining the minute Parts wrapt up in their *Seeds*, and not from any additional Parts they receive from the Earth they are planted in. But see this Curious Gentleman's further Remarks on this Head, in *Philosophical Transactions*, Numb. 287.

But to return to my Design; I would rather advise the Sowing of *Lemon* or *Citron-Seeds* than those of *Oranges*; for since neither of them will bear *Fruit* 'till they are either grafted or inoculated, and the *Lemon-Stocks* will as well receive the Buds of *Oranges* as those of its own Kind, they should be prefer'd for the sake of their quick Growth and hardy Constitution. Now as these *Seeds* will rise at least four Inches high during the Warmth of their first *Hot Bed*, let their Pots be shifted every five or six Weeks into fresh *Beds* 'till about *August*, and then begin to harden them for the *Winter*. I have seen *Lemon-Plants* rais'd after this manner, that have been near three Foot high the first Year; for growing together in little Groves, each *Plant* has a kind of Emu-
I
lation

lation to over-top the rest, as if they knew the ill Consequence of superior *Plants* dripping upon them. I have already hinted how much Shade contributes to the Growth of *Plants*, but shall once more re-mind the *Gardener* to defend these young *Plants* from the hot Summers Sun, and give them Air only Mornings and Evenings.

The *February* after they are rais'd they should be transplanted into small Pots, and be put again into a *Hot Bed*, 'till the Season is sufficiently warm to set them abroad; and in *July* some of them will be fit to *Inoculate*, and the rest to *Inarch* the *May* afterward.

The most proper Season for *budding* these *Trees* is about the tenth of *July*, at that time the *Buds* will readily grow; and the following Spring all the wild Part of the *Plants* above the *Buds* being cut off, and the Wounds cover'd with soft Wax, we may expect a good bearing Shoot of a Foot long at least, before *Winter*, if they have the help of a *Hot Bed*; and in two Years afterward they will begin to bear Fruit if they are well look'd after, and are not over potted.

But *Inarching* them is yet a much quicker way to make them bear both *Flowers* and *Fruit*; this Work is done in *May*, and by the latter End of *August* following, they may be cut off; they will then have Fruit upon

them, either green or ripe, as you made choice of bearing Boughs to inlay into the wild Stocks. I have heard of *Trees*, that in less than two Years, from the sowing of the *Seeds*, has had *Fruit* upon them by this means; and I have my self raised an *Orange-Tree* after this manner, that had *Fruit* and *Flowers* upon it when it was not six Inches high. Mr. Fairchild at Hoxton, by a peculiar Method he has in performing this Work, has now some hundreds of little *Orange* and *Lemon-Trees*, with *Fruit* upon them as large as any that is brought from abroad.

As I have now given such Directions for the Management and Improvement of *Orange* and *Lemon-Trees*, as I have my self practised with good success, I doubt not but such as are cultivated by these Rules will not be less vigorous and healthful, and for some particulars relating to the preserving them from Frosts and Damps in the *Winter*: See the foregoing Chapter of *Green-Houses*.





C H A P. III.

Of MYRTLES, JESSAMINS and GERANIUMS, *their Culture, &c.*

WE have many sorts of *Myrtles* in our *English Gardens* distinguish'd by the following Names: Those with the largest Leaves are the *Orange-leav'd Myrtles*, the *Spanish Broad-Leaf*, the *Portugal-Myrtle*, the *Nutmeg-Myrtle*, and that with the double Blossom: Beside which, we have the *Nutmeg-Myrtle* with variagated Leaves, which is accounted a Rarity.

Those with smaller Leaves are the *Upright-Myrtle*, the *Silver-leav'd Myrtle*, the *Box-leav'd* and *Birdsnest-Myrtles*, and the *Rosemary* and *Thyme-leav'd* Kinds. All these, except the *Orange-leav'd Myrtle*, and that with the double Blossom, are very easily propagated by Cuttings; but those two Kinds are much better encreas'd from *Layers*.

The most proper Season of laying *Myrtles* for Encrease, is in *May*, when the youngest Shoots only, such as are tender, should be bent into the Earth after it is well stirr'd;

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and those, if they are often refresh'd with Water, will strike Root, and be fit to take off from the Mother-Plants the Spring following; but if we lay down Shoots of a Year old, they will never strike Root with all the Art you can use: So we must likewise observe, that the Cuttings we design to plant should always be young and tender, such as we find upon the *Myrtles* in *July*; 'tis then the most proper Season for planting them, stripping off the Leaves two Inches from each Cutting, and setting them that depth, about an Inch a-part, in Pots of fine light Earth, watering them frequently 'till they have taken Root, which will be about the latter end of *August*. This young Plantation should remain 'till the second *March* before they are transplanted into single Pots, for to remove them sooner would endanger them, because then their small tender Roots would not be sufficient to draw away the moisture of the Earth about 'em so quickly as one would wish, and then it would chill the Roots. However when they have once got large Roots they delight in Water, and should be frequently refresh'd with it: They covet the Shade in the *Summer*, and will by means of that Help make much stronger Shoots than those that are exposed to the *Sun*.

About *Mid-April* such old Trees as have been neglected and have thin Heads, may be pruned about the Roots, and fresh Earth put
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to them, and have the Branches of their Heads cut within three or four Inches of the *Stem*: Being thus order'd, they will prepare for shooting by that time they come abroad, and make handsome Plants that Summer, if they have Water and Shade enough.

The *Myrtle* delights so much in Moisture, that I have known a Pot of it set in a shallow Bason of Water, withinside of a Window exposed to the *South*, that has shot above four times as much in one Summer as any that have stood abroad, and has continued growing at that extravagant rate for some Years, without renewing the Earth in the Pot, by only taking care to supply the Bason with fresh Water as it wanted; but the Shoots of this *Plant* were very slender.

In disposing of these and other *Plants* in the Shade, we must not suffer any Trees to drip upon them, or confine them in too close a place, they must have the free Air round about them and above 'em, or else the Shoots they make will be slender and weak.

The next *Plant* I shall take notice of is the *Jasmin*, of which we have many sorts which will not bear the Cold of our Climate, and are therefore shelter'd in the *Conservatory* during the *Winter*: They are the *Spanish-Jasmin*, the *Portugal-Jasmin*, the *Indian-Jasmin*, the *Arabian-Jasmin*, one sort with single white Flowers, the other with double

Blossoms ; and the *Coffee-Tree*, which is another kind of *Jasmin*, blossoming at Autumn : Besides these, there are many other Kinds in the *Amsterdam Gardens* which would be too tedious to mention.

The *Spanish-Jasmin* is the most common of these ; it bears white Flowers tinged with Purple on the Back of the *Petals*, or *Flower-Leaves*, and is very well scented : The Time of its Blossom is from *August* to *November*, and sometimes all the *Winter* if it be kept warm and have Sun enough ; this is propagated by Grafting it on the *Common White Jasmin* in *March*, as also by Inarching it in *May* upon the same common Sort, and the inarch'd *Plants* may be cut off the middle of *August* following. In *February* we should always cut off the Branches within four or five Inches of the Stem ; and after they have fresh Earth put to their Roots, they may be set near the Glasses or Windows of the House ; these love not too much Water, and a *medium* Soil between Sand and Clay, without Dung ; they are to be housed with the *Orange-Tree*.

The *Portugal-Jasmin* likewise bears a white Flower tinged with Purple, but the Blossoms are not so large as those of the former, tho' in much greater Number : Sometimes I have seen near one hundred in a Cluster ; they smell like *Orange-Flowers*, and last a long time ; the Leaves of the Plant
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are ever-green (as are those of the former) somewhat resembling those of the *Ivy*, it is propagated like the fore-going *Jasmin*, and likewise by Cuttings planted in *May*, taking notice that they be of young Wood, and that at least one Joint be set in the Earth, for at that part they take Root, tho' not 'till the second Spring after Planting: I find that the *Plants* raised from *Cuttings* are apt to shoot very vigorously, and are therefore barren; but those which are *grafted* or *inarched* upon common Stocks blossom every Year very strong, which may proceed from the difference of Vessels in the Stocks, and the Graft which checks its over Vigour.

This *Plant* begins its Blossom in *August*, and continues flowering 'till *October*; we may cut off the *inarched Plants* in the middle of *August*, which is the time of releasing all other *Plants* grafted in the same manner, setting them immediately under some Shelter, least they be damaged by the Winds, which often break the *Cion* from the Stock. For this End of *Inarching*, we should be careful to make Provision of some *Plants* of the *Common Jasmin* in Pots the Year before we design to graft, otherwise they will not be vigorous enough to incorporate with the *Cions*.

This *Jasmin* should be set in and out of the House with the *Orange-Tree*, putting fresh Earth to the Roots in the Spring and

Autumn, as we must do to every other *Exotick Plant*: But as *Orange-Trees* love Shade in the *Summer*, this cannot have too much Sun.

The *Indian Jasmin* has Leaves somewhat like the former; it bears Bunches of yellow Flowers of a very agreeable Scent; it begins to flower about *August*, and continues its Blossom 'till the Spring following. I have frequently gather'd ripe *Seeds* of it, and have raised *Plants* from them, sowing them as soon as they were ripe, and giving them the assistance of a *Hot Bed*: But the most common way of raising this *Plant* is from *Layers* in Autumn, or in the Spring, when we can get young Shoots to lay down, which should always be as tender as possible for this Work, or they will not strike Root, which must be observ'd as a Rule in the laying of every kind of Plant. The *Layers* of this *Jasmin* will not be sufficiently rooted 'till they have been a full Year in the Ground, and then may be taken off and planted in single Pots. The best Seasons of transplanting this Kind, is either in *April* or middle of *August*, the Earth for *Orange-Trees* does very well for this *Plant*, and it must be housed as the other Kinds of *Jasmin*.

It would be well to try whether this Sort would not encrease by Inarching it upon the *Common Jasmin*; I see no reason why it should

should not as well as the *Portugal* Kind ; but if that will not do, the *Common Yellow Jasmin*, I think, can hardly fail.

We have two Kinds of the *Arabian-Jasmin*; one with single Flowers, and the other with double Blossoms ; in other respects they are alike, and require the same kind of *Culture*; the Flowers of both are white and extreamly sweet-scented, but are somewhat differing from the other kinds of *Jasmin* in their Figure: Both these Sorts blossom about *August*, and with good Management bring a great many Flowers ; the Leaves are round, somewhat curl'd, and set on in Pairs at the Joints; I have raised them from Cuttings taken off in *April*, when these Plants should be always pruned within two or three Joints of the Stem, and then have fresh Earth put to their Roots ; by means of this Pruning they will shoot near a Foot in a Summer, as I have seen at the *Leyden Gardens*, where they have near one hundred of them in good Health.

This has been esteem'd a very tender Plant ; but I find it is more injured by Wet than Cold ; it will stand the *Winter* very well in such a *Green-House* as I have described, if it has not too much Water, and may be set abroad the latter end of *May*, or beginning of *June*, and remain out of Doors 'till about the 20th of *August* : The Earth it chiefly delights in is at least two

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Parts in three of Sand, and the rest fresh Mold from under a Turf: We may try to inarch it upon the *Spanish-Jasmin*, or increase it by *Layers* at the Pruning Season.

The *Coffee-Tree* is another Kind of *Jasmin* brought from *Arabia Felix*, about the Latitude of twenty or twenty one; the Leaves are like those of our *Chestnut-Tree*, but are ever-green, and the Flowers like those of our *Common Jasmin* in Figure and Colour, but are not so sweet-scented; they grow in Clusters at the Joints, near the Extremities of the young Branches. About *July* this Plant begins to blossom, and continues flowering 'till *October*, setting plentifully with Fruit, which remains upon the Tree 'till the *July* following before they ripen, and are then of a dark red Colour, and in their Shape and Size somewhat resembling the *Berries* of the *Lauro Cerasus*, but have two *Kernels* in each of them, which split in the middle like the *Bay-Berries* of the Shops.

In the *Amsterdam Garden*, which is so famous for curious *Plants*, I have seen some of these Trees near eighteen Foot high, so full of *Berries*, that several Pound Weight of Fruit was gather'd off of two Trees only. The *Hollanders* first got *Plants* from *Arabia*, which they afterwards planted about *Batavia*, and having increas'd them there, they
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supply'd the Garden at *Amsterdam* with them, and have now raised so many from Seeds that ripen'd in *Holland*, that they have sent over several Trees to their Settlement at *Surinam* in the *West-Indies*, in order to cultivate them in that Country, where they will undoubtedly turn to good account, as I am perswaded they would do if they were propagated in the *South Parts* of *Carolina*, which I think would be well worth our Trial, if that Country remains in our Hands.

In the Culture of this Plant the *Dutch Gardeners* prepare a Soil for it compos'd chiefly of Sand, and the Refreshings they give it with Water are seldom and sparing in the *Winter*; but in the *Summer* it has a more plentiful Allowance, especially during the time of its Blossom. About *June* they take it out of the House and wash and clean the *Leaves* and *Branches*, and letting it remain in the Air 'till the beginning of *July*, they then set it in again to the *Conservatory* for flowering. In *April* and *August* they give fresh Earth to the *Plants*; and they thrive extreamly.

In the raising of these *Plants* from *Seeds*, they first separate the *Kernels* in each *Seed*; and after they are cleansed from the Muscilage about them, they are immediately set two Inches deep in Pots fill'd with sandy Soil, and plunged into *Hot Beds*: The *Seeds* being

ing thus order'd, must be kept moist by frequent Sprinklings of Water 'till they come up, and the Glasses over them always kept close; about six Weeks after Sowing they will begin to appear, and have two or three Leaves a-piece before *Winter*. I have heard that unless the *Seeds* are sown as soon as they are gather'd they will not come up; and hitherto there is no other way known of propagating this *Plant* but from *Seeds*, tho' I think it would not be against reason to try to Inarch it upon some other Kind of *Jasmin*.

The *Geranium* is a *Plant* whose Varieties are very considerable, if we were to join those of our own Country with the Kinds we receive from *Africa*; it takes its Name of *Cranes-Bill* from its Seeds, which somewhat semble the *Beak* of a *Crane* or *Stork*: Hitherto the *Exotick Kinds* have carry'd *Latin* Names only, which I think help to confound some *Gardeners*, and indeed are too long to recite; I shall therefore, since I have this Opportunity, give each Sort, which we cultivate at present in our *Green-Houses*, a short *English* Name for the greater Ease of the Memory.

Many of the Sorts I design to treat of have been figur'd by the Learned and Accurate Dr. *Commelin*, *Botanick* Professor at *Amsterdam*, and that late admirable *Botanist* Dr. *Herman* of *Leyden*, to whose Works I refer

refer for the Cuts of those I am about to mention.

In the *Hortas Lugduno Batavus*, Page 275, we find the *Geranium Africanum Arbore-scens*, *Ibisci folio rotundo*, *carlinæ odore*, which we may *English* the Round Mallow-leav'd Cranes-Bill.

Page 278 of the same *Geranium Africanum Frutescens*, *malvæ folio Laciniato odorato*, or Notch'd Mallow-leav'd Cranes-Bill.

Page 283, *Geranium Africanum*, *Alchimillæ Hirsuto Folio*, *Floribus Albidis*, or Alchimilla-leav'd Cranes-Bill.

Page 285, *Geranium Africanum*, *Noctu Olens*, *tuberosum & Nodosum*, *Aquilegiæ foliis*, or Colombine-leav'd Cranes-Bill.

In Dr. Commelin's *Præhud. Botonic.* Page 51, *Geranium Africanum Arborescens*, *Alchimillæ hirsuto folio*, *floribus rubicundis*, which we may call the Painted-leav'd Cranes-Bill, as I shall further explain.

Page 52, *Geranium Africanum*, *foliis inferioribus Asari*, *superioribus Staphydis Agriæ*, *Maculatis*, *Splendentibus*, & *acetosæ Sapore*, which we may name Spotted Ivy-leav'd Cranes-Bill.

Page 54, *Geranium Africanum frutescens folio Crasso*, & *Glauco*, *acetosæ Sapore*, or Sea-green Cranes-Bill.

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Beside these, we have in our *Gardens* two Dwarf Kinds of *Cranes-Bill*, with tuberous Roots, whose Flowers smell sweet in the Night: I have not seen any Cuts of them, and therefore shall not give the Authors Names; the one I shall call the *Anemone-leav'd Night-scented Cranest-Bill*, and the other the *Fenil-leav'd Night-scented Cranest-Bill*.

The First of this List makes a Shrub of three Foot high; the Leaves smell somewhat like *Rhubarb*, and it bears large Bunches of Purple Flowers variegated with a darker Colour; this blossoms from *July* to *September*.

The Second, with the notch'd Leaves, is a Shrub about the height of the former, with sweet-scented Leaves; the Flowers are small, and of a very pale purple Colour, and appear about *May* and *June*.

The Third has Leaves like the Plant call'd *Ladys Mantle*, is a low Plant in comparison with the others, and bears white Flowers about *June*.

The Fourth has large Knots at the Joints, and Leaves like the *Columbine*; the Flowers which commonly appear in the *Summer* are extremely sweet in the Evenings, but have no Scent in the Day-time.

The Fifth, which I call the *Painted-leav'd Cranest-Bill*, makes a Shrub sometimes four Foot high, and blossoms very plentifully all the

the *Summer*, bearing large Clusters of Pink-colour'd Flowers; each of its Leaves are curiously mark'd with a dark-colour'd Streak in the shape of a Horse-Shoe; which together with the pleasant Green of the Leaf is very beautiful: And what is likewise worthy our Notice, when these Leaves decay the green Parts change into a fair Yellow; and the dark Streaks, which are naturally almost Black, alter into a bright *Vermillion*; so that I cannot help sometimes, for the sake of so agreeable a Variety, bruising some of them to forward their Decay. The Alteration of Colours in the Leaves of this *Plant* gave occasion to a Learned *Member* of the *Royal Society*, Dr. *Stuart*, to consider the Cause of different Colours in the Leaves and Flowers of Plants, which he has so judiciously set forth in a Letter he was pleas'd to honour me with upon that Subject, that for the Embelishment of my Work, I shall insert it in the Conclusion of this Chapter.

The Sixth Kind mention'd in the List has shining Leaves like those of *Ivy*, and pretty Flowers, of a pale purple Colour, variegated with a deep Red; the *Plant* inclines to run upon the Ground, and therefore to give it the better appearance, we are forced to support it with Stakes; it blossoms in the Autumn.

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The Seventh has thick juicy Leaves of a Sea-green Colour, tasting somewhat like *Sorrel*; the Branches are naturally so weak that they must be supported with Sticks. About *July* this *Plant* begins to flower, and remains blossoming 'till about *September*; the Flowers of this Kind are of a pale Flesh Colour, and variegated with Crimfon.

All these Kinds are propagated either by *Seeds* or *Cuttings*; the *Seeds* may be sown in *March* upon a *Hot Bed*; but the most proper Season of planting the *Cuttings* is about the End of *May*, and then they will easily strike Root in the natural Ground, and become handsome *Plants*, fit to be potted the *August* following; they love a medium Soil without Dung, and delight in Water; they may be housed with the *Orange-Trees*, for they are not very tender.

The other Kinds of *Geranium* sur-nam'd *Night-scented* Blossom at uncertain times in the *Summer*, and are propagated by parting their Roots in *May*. The Leaves of the *Fennel-leav'd* Kind; have a very grateful Scent; both these are hardy, and may be housed with the others; they love a light Soil.

I shall now conclude this Chapter, with the Ingenious Letter which I promis'd relating to the Colours in the Leaves and Flowers of *Plants*.

To Mr. BRADLEY.

London, May the 9th. 1717.

S I R,

YOUR ingenious Conversation, join'd with the Delights of Mr. *Balle's* curious Gardens at *Cambden-House*, made such an Impression t'other Day, as led me into the following Thoughts on the Subject You then started, concerning the Variation of Colours in the *Leaves* and *Flowers* of *Trees* and *Plants*, such as is remarkable in the variegated *Hollies* and *Tulips*; of which Variation you have certainly assign'd the true remote Cause, in the second Part of your *New Improvements of Planting and Gardening*, Cap. VII. Sect. 1. of the *Tulip*, where you assert, that a Weakness and Defect of Nourishment produce that Variety of Colours, which was not naturally and originally in the *Plant*, which you support by Observations, Experiments and Histories there, and in several other Parts of your Works, so as to put it beyond all doubt.

On this Occasion you show'd me a bruised and faded Leaf of the *Geranium Africanum Arborescens Alchimilla hirsuto folio, floribus rubicundis*, *Comel. Prol. Bot.* partly Green, but turn'd of a pretty deep Red in the bruised Parts; this gave Rise to our Discourse con-

PART III.

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cerning the immediate Cause of the natural Colour in Plants, and of this preternatural Colour in the bruised Parts. — I'm persuaded I shall not be able to give one of your Taste any Satisfaction on this Subject; I only venture to send you some loose Thoughts concerning it, being assured that your various Observations and Experience will soon expunge the Errors of one less conversant about these things.

I imagine then that the natural, as well as preternatural Colours in *Plants* and *Flowers*, are owing immediately to the Juices circulating or contain'd in their Vessels, and not to the Vessels themselves, which I think appears by the express'd Juice retaining the Colour of the *Leaf* or *Flower* from which it's drawn, while the gross fibrous Part, which is the Vessels retain'd in the Strainer, lose their Colour with their Juice, and being examined by the naked *Eye* or a *Microscope*, appear colourless or transparent, so far as they are drained of their Contents: These then being transparent, reflect few Rays to our Eyes, but transmit most of them, which the more opaque Mass of Fluids reflects, giving us such coloured Rays of Light, as it cannot absorb or transmit. 'Tis from the Juices then we have the several Colours of *Plants* and their *Flowers*; but what special Texture of the Fluids, and their Surfaces, or of any other Object, may be necessary

necessary to reflect this or that Kind of coloured Rays, for ought I know, is not determined with any absolute Certainty.

But as most of our Knowledge of Nature consists in our being able to assign some remoter Causes, and a few Effects of things, in some gross Manner, rather than in an intimate Acquaintance with their Essences; So after the same manner we may be able to go some Length in this Disquisition, towards finding out the remoter Cause of Colour in the Juice of *Plants*, tho' we cannot point out the minute Figures in the Particles of that Fluid, which may immediately produce this Effect.

Thus then the Blossoms and Fruit produced according to the Nature of the ingrafted Branch, and not of the Stock of a different Kind, do shew that the circulating Juice of *Vegetables* is alterable by the Mould of the Vessels through which it passes, so as to be forced by them to put on a different Colour and Taste from what it had before it entered them; and we find this equally true in Animals.

There's only some, and those very few, Exceptions of Juices in Plants, and common Salt in Animals, which seem to be unconquerable by the Power of their Vessels, so as to be able to pass through them, and circulate for some time, without any sensible Alteration. The Chymical *Analysis* of the Blood-

Blood, Urine, &c. of such Animals as use common Salt in their Food, having discovered it unaltered in any of its Qualities, after many Circulations in the Animal Body : And by your own Experiment, mention'd *Cap. I. Part I.* of your *New Improvements of Planting and Gardening*, and Mr. Furber's, *Cap. II. Sect. I.* of the same Works ; by these Experiments I say it appears, that some Juices are so far from being liable to suffer any Alteration by the Vessels of the *Plant* in which they circulate, that they rather seem to have the power of altering the natural Frame and Texture of the Vessels themselves, and of making a very lasting preternatural Impression upon them, by which they become capable afterward of moulding and framing their Juice to a different Colour from what it had naturally, and before the Experiment ; else it would be very difficult to conceive how such a small quantity of Juice, communicated from a single Bud of yellow strip'd *Jasmin*, inoculated upon a Branch of a plain *Jasmin-Tree*, should in three Months time (supposing it self to perish as the Experiment allows immediately after that time) be able to occasion such an Alteration of the natural Juice of the whole Tree, to the Colour of the Bud inoculated, continually through all the succeeding Years of that Tree's Duration ; for such a durable Effect must have a permanent Cause,

Cause, but that cannot be found in the fluctuating Juice, which is daily wasted and renewed, but must be owing to some Alteration in the Figure or Diameters of the Vessels, which may be supposed to continue the same for many Years after, unless some new Alteration be industriously, or by some uncommon Accident, wrought upon them: The Conclusion to be drawn from Mr. Furber's Experiment will be much the same.

But Instances of this kind being very rare, we are only to regard the common Course of Nature, which has made these circulating Juices generally alterable by the Power of the *Solids* or containing *Vessels*, both in *Plants* and *Animals*. Thus the Juices do seem to get and retain their several natural Colours from the *Solids*, so long as they continue in a due Course of Circulation through them. — But when the Circulation, for whatsoever Cause, begins to fail or become languid, there seems to be yet another possible Cause of Colour in *Plants*, to wit, of those preternatural Colours or Variegations, subsequent to a defect of Nourishment, or a Wound, or Bruise in any of their Parts: In all which Cases, the Circulation and concurring Energy of the Vessels are languid, and therefore a Degree of Stagnation ensues: And as every Stagnation of a vegetable Juice is attended with a proportionable Degree of Fermentation, and Fer-

mentation is productive of considerable Alterations, both in the Taste and Colour of the fermenting Juice, it may not be altogether improbable, that, in the Cases mentioned, the variation of Colour may proceed from certain degrees of Fermentation in the Juice; tho' I only advance this as a probable Conjecture, and not what I can from any Experiment demonstrate.

However, to render this Conjecture somewhat probable, we are to consider, that the constant natural Tendency of all recent vegetable Juices is to Fermentation, which commences so soon as they are left to themselves, or delivered from a progressive local Motion of the whole Mass: This appears in the expressed Juice of the *Grape*, and of all *Fruits*, and in *Malt Liquors*, which from the Beginning are in a few Days carried to the height of Fermentation, in which time they acquire, first a sweetish, and afterwards a vinous Taste; and by a second Fermentation (which in the weakest of them happens very soon after the first) become Vinegar or sour; their Colour at the same time becoming less saturated, more transparent, less opaque. But this is yet more remarkable in the Juice of high-coloured Flowers, as of the *Clove July-Flowers*, *Corn-Poppy* and *Violet*; all which Juices are apt to ferment in some little time after Expression, and in the Fermentation sensibly lose a good deal of their

their Colour, become paler, and more transparent: Indeed the *Violet* Juice loses almost entirely its Colour in Fermentation. The same Fermentation happens to the Juice of *Vegetables* yet contain'd in their *Vessels*, and enjoying some low degree of irregular Circulation, as appears by *Herbs, Grass, Hay, Flowers, Fruits, &c.* cut down and thrown together in a Heap, where all the Signs of Fermentation do very soon appear; such as *Heat, Sweating*, change of *Smell, Taste and Colour*; so that it seems plain, that Fermentation in all its Effects takes place in the vegetable Juices, so soon and as far as the Circulation declines: These two different Powers, or Operations of Nature, being so contrary to one another, that they cannot subsist together in Perfection; but like the opposite Weights in the Scales of a Ballance, as the one preponderates the other must give way. And indeed the Case in Animals is very near parallel to this, if we substitute Putrefaction in them to Fermentation in *Vegetables*; for in those we find, that the Blood in a bruised Part degenerates from its natural Colour by Stagnation, into a Livid, Blue, Green and Yellow (all Signs of Putrefaction) successively, until the Re-absorption be perfected, and the Circulation restored. — This is farther illustrated by the common Practice of ripen-

ing green Fruit in Straw, or in a moderate Warmth, where Evaporation of the Juice and Defecation may be avoided; which shows that the change of Taste and Colour can be owing to nothing else here than a certain slow degree of Fermentation, entertain'd by that Artifice in the Juice contained within the Vessels or Vesicles of the Fruit: Was there indeed a free and open Communication with the external Air, this Fermentation wou'd go on to produce the same Effects much quicker, as we see in the same Juice expressed; And as all Experiments in Fermentation do shew, that either a total Stagnation, or some degree of it, and Heat, are necessary to produce Fermentation in vegetable Juices, the Autumn affording us a slow Circulation of the Juices, and an increased Heat; these two concurring must needs produce that degree of Fermentation, to which we owe the ripeness of our growing Fruits, and the change of their Colours and Taste in that declining Season; as we owe the ripeness of our Liquors more remarkably to the very same Causes: And was it possible there should be a perpetual Spring, that is, a continued equal brisk Circulation of the Juices, with such a low degree of Heat as that Season affords, it would be equally impossible to produce ripe Fruit, because the two Pre-requisites of Fermentation wou'd be wanting

wanting in Nature, tho' Art might in some measure supply that Defect.

The Conclusion then seems to be this, That Circulation and Fermentation are the two only Powers in Nature which can produce the Variety of Colours, and the other Changes we observe in Vegetables; as Circulation and Putrefaction are the two Powers that work the various Changes in Animals: And that as the due degree of Circulation in either declines, or is impair'd, Fermentation or Putrefaction takes place respectively, exhibiting the Signs of Diseases or Decay, of which themselves are the immediate Causes.

If I rightly remember, something was mentioned in our Conversation concerning the different Strength of the coloured Rays of the *Sun*, and whether the Reflection of these stronger or weaker Rays might not depend upon a suitable Strength and Weakness in the Texture of the *Plant* or *Flower*; as if the strongest Rays, which are the Red, being reflected by a red *Flower*, might not argue a greater Strength in the Texture of that Flower, or its Juices, than is in the Blue *Flowers*, which reflect only the Blue, to wit the weaker Rays of the *Sun*.

If we may judge of the Strength of the Rays of the *Sun*, by their different degrees of Refraction in passing through a *Prism*; as their Refraction increaseth, so their Strength de-

decreaseth in this Order; *Red, Orange, Yellow, Green, Blue, Purple* and *Violet*; so that the *Red* is the strongest, suffering least Refraction, and *Violet* the weakest as it suffers the greatest Refraction. But when we consider these Rays, as reflected from opaque Bodies, we find that Objects of the weakest Texture reflect the same kind of Rays with those of the strongest Make, as *Red* is shewn by the tender *Tulip*, as well as by the more durable *Rose*; and so in a Variety of other Objects, differing yet more in Strength or Weakness: So that the Strength of Bodies reflecting Light, seems not to be so much concern'd in the Reflexion as the Frame and Disposition of their Surfaces, which may be the same in the weakest, as in an Object of the strongest Composition. Besides, the Strength of the Texture of *Plants* and their *Flowers*, seems to depend more upon the firmness and disposition of their Vessels, than upon the consistence of their Juices; but the Vessels, being transparent, are least concern'd in the Reflexion of Colours; therefore the reflected Colour seems not to depend upon any proposition of Strength or Weakness in the *Plant* or *Flower*.

Thus, Sir, I have ventur'd to shew you how superficial and conjectural my Knowledge on this Subject is, in hopes that you'll forgive

forgive and correct the Faults which my Compliance with your Desire has led me to discover, being with sincere Respect and Esteem,

S I R,

Your most Humble

And Obedient Servant,

Alexander Stuart.



C H A P. IV.

Of the MELIANTHUS, OLEANDER, MALABAR-NUT, LEONURUS, AMOMUM PLINII, CAPER, ACACIA, APOCINUM, and other Exotick Shrubs, which are not succulent, their Culture.



F the *Melanthus* we have two Kinds, the Greater and the Lesser; they are both *African Plants*, and blossom freely with us, especially if they are not used too tenderly. The large Kind will stand abroad during the Winter, and seldom fails to produce its Spikes of Flowers every Year, which are of a *Coffee Colour*: These Flowers afford each of

of them a drop or two of a clammy Juice, tasting as sweet as Honey, from whence I suppose it took its Name of *Melianthus* or *Honey-Flower*. The smallest Sort is not so common with us as the other, and is therefore kept in the House all *Winter*; tho' I am of opinion it would stand abroad as well as the large Kind, which comes from the same Country. The Flowers of this small Sort are very beautiful, having a Mixture of Red, Green and Yellow in them; both these *Plants* are propagated with ease from Slips taken from about the Roots any time between *May* and *August*; they delight in sandy Soil and much Water, especially the large Kind; both these are design'd with great Accuracy; the First in the *Hortus Lugd. Bat.* and the small Sort in Dr. *Commelins's Plant. Rarior. Amstelod.*

The *Oleander*, or *Nerium*, which some call the *Indian Laurel*, has many Varieties. The most common of them in the *English Gardens* is the Sort with the red Flower, which is call'd the *Scarlet Oleander*, it is so hardy, that I have kept it abroad all *Winter* without any other Shelter than a *South Wall*; it is easily propagated by *Layers* in *April*, which will strike Root to transplant the *August* following. We have likewise a white flowering Kind, as hardy as the scarlet Sort; but the other Varieties of this *Plant*, such as the *Sweet-scented Oleanders*, with
Single

Single and Double Flowers, are esteem'd more tender, and should be housed with the *Orange-Trees*; all these blossom in *July* and *August*, and are propagated like the *First*; they love a medium Soil, without Mixture, and moderate Watering: See the Figures of the two last in the *Hortus Lugd. Bat.*

The *Adbatoda Zeylanensium*, call'd by our Gardeners the *Malabar-Nut*, is very apt to blossom with us, but has not yet, as far as I can learn, produced any ripe Fruit in *England*; it makes a large Plant, and is pretty hardy, and is an extravagant Lover of Water: The Earth should be the same as for the *Oleander*, and the Pots large; for these Trees encrease prodigiously in their Roots, which should be prun'd every *August*, and fresh Earth put to them: This is increas'd from Cuttings planted in *May*, which strike Root very easily in the natural Ground; it must be housed with the *Orange-Tree*. There is a good Cutt of this Plant in the *Hortus Lugd. Bat.*

The *Leonurus* is a Plant of the *Cape of Good-Hope*, named by *Breinius*; it is of the Species of the *Sideritis*, or *Iron-Wort*, in which Tribe Mr. *Ray* has placed it: We have two Sorts, one with Leaves like *Hemp*, and the other with round notch'd Leaves like those of the *Lamium*, or *Dead-Nettle*; the Flowers of both Kinds are alike, of an
Orange

Orange Colour, and of the same Size and Figure, blossoming in *September* and *October*; they are both easily propagated by Cuttings planted in any of the *Summer* Months upon a common Border, where they soon strike Root if they have Water enough; the Earth for the foregoing Plants is very fit for this, and in every respect should be treated like the *Malabar-Nut*.

The *Amomum Plinii*, or *Tree Night-Shade*, is a pretty Shrub, easily propagated either from Seeds or Cuttings, which we may put into the natural Ground in *May*; the Berries are somewhat like *Cherries*, and ripen soon after the Plant is brought into the House, and remain upon the Plant all *Winter*; it is call'd by some therefore, the *Winter Cherry*, which is the most common Name: Its Culture is the same with the foregoing Plant; only to make it bear Fruit plentifully, it may be brought out of the House with the *Myrtle*; and during the *Summer* it must stand in some place defended from the Sun, and constantly supply'd with Water; but it will not bear any Fruit if it be set under Trees: It is so hardy, that I believe it would stand abroad all the Year, but I have not try'd it.

In the same Tribe is the *Mala Insana*, or *Mad-Apples*, or the *Solanum Pomiferum*, which is extremely well figured in the *Hort. Ludg. Bat.* It has Leaves deeply notch'd and
I arm'd

arm'd with *Spines*; the Flowers are of a deep Purple, and the Fruit before they ripen variegated with White and Green; and being fully mature, are as large as ordinary *Golden-Pippins*, and of a bright yellow Colour; these Fruits ripen in the *Winter*, and contain many small Seeds, like those of the *Capsicum Indicum*, or what we call *Guiney-Pepper*; they may be sown in *March* or *April* upon Hot Beds, and will bear Fruit the second Year: Give this Plant the same Earth as the *Orange-Tree*, and house it at the same Season: This, like all other potted Plants, must have fresh Earth every Spring and Autumn. Besides this, we have another Kind, whose Leaves are shaped like those of the *Oak*, but are so hoary that they seem to be made of white Woollen-Cloth; this Sort bears smaller Fruit than the other of a Golden Colour, which also ripen in the *Winter*; it requires the same Management as the former Kinds.

The *Caper* has been propagated with great Care in our *Green-Houses* to very little purpose: Where the greatest Industry has been used, it has hardly been brought to flower in *England*; and tho' it has had the Advantage of the best Stoves, it has been subject to die in the *Winter*, which has given occasion to some *Gardeners* to believe it was too tender for this Climate; but that Notion is unseasonable, since we know the *Caper*

per is an *European Plant*, growing familiarly about *Genoua* and the *South Parts* of *France*; the Soil and Situation is only to be consulted to make it thrive very well in *England*, even in the open Air. It will resist the Severities of our *Winters*, as I have experienced, being sown in the Cracks of old Walls, where it strikes Roots in the Morter: Where it grows wild, it grows in like manner on the sides of rocky Places among Rubbish, and in Holes of old Stone-Walls or Ruins: If even it is planted in a Pot of Rubbish it will not thrive, if it is directed to grow upright, but must rather be so disposed, as either its Root may be somewhat above the Branches, or at least it may grow parallel with the Earth, such as it will do if it be set in the Side of a Wall. The Blossoms are very beautiful, of a *Peach-Bloom* Colour, crouded with *Tendrils* or *Stammas*: The Buds of these Blossoms are pickled for Eating. It may be as well propagated in *England* as in any other Part of *Europe*, by observing the Method I describe, and sowing the *Seeds* in *March*, which readily come up, if we cover them with sifted Rubbish after we have laid them in the proper Places. It has been a great Fault that some have been guilty of, when they have receiv'd *Plants* and *Seeds* from foreign Countries, to give them too much Warmth, without considering whether they came from the *North* or the

the *South* ; from *Moscovy* or *Greenland*, or under the *Line*. I am of opinion it would be as hard to keep an *Iceland* Plant with us as one that grew immediately under the *Line* ; for as the one is naturally maintain'd by excessive Cold, so is the other by extream Heat. I imagine that the greatest Cold of our *Winters* is near the same with the Temper of Air in the *Summers* of those Countries, lying in seventy, or seventy five Degrees Latitude ; and if so, then the *Plants* from those frozen Parts of the World could only be made to grow with us in our colder Seasons, when perhaps they would not be naturally enclin'd to shoot, for then the Sun would be far distant from their native Country, which would be the time of their *Winter* ; and if we could make them shoot at that time by our natural Temper of Air, the Heat of our *Summers* would afterward scorch them to death, or smother 'em, unless they were to be kept in *Ice-Houses* during the Season of our warm Weather, and not exposed abroad 'till our Frosts began : For if we are to follow Nature in the *Culture* of *Plants* from hot Countries, we must do the same in the Management of those from the frozen *Zone* ; we must imitate the Heat of one, and the Cold of the other.

Let us not therefore mistake, in supposing that the same degree of the Sun's Heat, and the same Temperature of Air, which is na-

tural to any one Part of the World ; is necessary for the setting in Motion the *Sap* of the several *Plants* natural to divers Countries : As every Climate is different from the rest, so are the several *Plants* in those Climates naturally adapted to grow by means of the wonted Temper of Air and Warmth of their native Countries, and will not thrive near so well in Stations, only a little differing from the Place of their Birth : And indeed it is partly the same in living Creatures, which we find do not all require the same degrees of Warmth for hatching them from their Eggs : The same Heat which hatches the Egg of a *Pullet* would destroy the Eggs of *Insects* : And I suppose that the Warmth which hatches a *Pullet*, would not be half enough to hatch the Egg of an *Ostritch*, who is forced to lay her Eggs in the scorching Sands of *Africa* to bring them to Life.

It is observable, that *Mosses* of several Kinds only grow with us in the *Winter* ; and at the least approach of warm Weather they decay, and are entirely at a stand, and seemingly dead when our *Summers* begin, which may shew us that there are *Plants* that grow in certain degrees of Cold (as we call it) as well as Heat ; for *Mosses* are no less perfect *Plants* than *Oaks*, or other the most remarkable *Trees* ; they have *Roots*, *Branches*, *Leaves*, *Flowers* and *Fruit*, as well as the most notable *Plant*. I have heard
that

that the colder Climes abound with *Mosses*, which are still larger and in greater Quantities as we go more towards the *North*; and that they serve for Food for the *Rane Deer* in the *North* Parts of *Moscovy*. I remember once to have seen a *Plant* brought from about *Norway*, which grew in sixty five or sixty six Degrees, that budded out in *December*, and continued growing 'till the following *March*; but after that I am not well assured what became of it: But 'tis time now that I return to the *Culture* of those *Plants* I undertook to treat of in this *Chapter*. Besides the *Caper* already mention'd, we have two other Kinds, that with the small yellow Flower, and the *Bean Caper*, they are both raised from Seeds sown in *March* in sandy Soil; the first requires the *Green-House* in the *Winter*, but the other will thrive very well in an open Border, as I've seen it do in the *Amsterdam Garden*, altho' it is commonly housed with great care in *England*.

I have seen many Sorts of *Acacia* cultivated in the *Amsterdam Gardens*; and I remember formerly three or four sorts of them were growing among the Rarities at *Hampton-Court*; but at present we have few of them in *England*, unless it be the *Virginian Kind*, which grows to a large Tree, and will stand abroad without Shelter in the *Winter*; as we may see some of them now growing in the Court before *Russel-House, Bloomsbury*,

and in the Old Palace Yard, *Westminster* ; a plain Proof we might easily naturalize the *Virginian* Plants to our Climate. The Leaves of this, and other *Acacia*'s, are not unlike those of the *Tare* or *Vetch*, and differ from one another chiefly by being larger or smaller, and not in their Shape : Some again are vary'd from the rest by having large Spines or Thorns growing upon the Foot-Stalks of the Leaves, sometimes as large as Cock-Spurs, and the Flowers of some of them are sweet-scented ; these, as they come from several Parts of the World, should be consider'd in relation to the Heat necessary for them ; but they all, so far as I yet have observ'd, love a dry sandy Soil, and little Water.

The *Apocinum*, or *Dogs-Bane*, has many Varieties ; some growing upright like little Trees, and others climbing and creeping on the Ground like the *Woodbind* : The Flowers in their Shape are not much unlike those of the *Amomum Plinii*, but have their Petals turn'd more back ; their Colours are various ; these all bear Cods, for the most part shaped like those of the long *Guiney Pepper*, but their outsides commonly cover'd with long tender Spines of the same Colour with themselves ; within them are the Seeds lying as it were in a Bed of Cotton, some of which adheres to each of them ; from the Seeds we may propagate them with ease, by sowing
ing

ing them in *March* on *Hot Beds*, or else raise every sort I have yet try'd, from Cuttings in the same Month, unless they be such as have tuberous Roots, which must then be parted; and some indeed which die to the Root every Winter, will be better increased from *Off-sets* taken from the Roots: I give them commonly a light natural Soil, which I find agrees well with them, and little Water, for they are all very Milky, and apt to rot with much Wet. As to their Shelter in the *Winter*, it may be given them according to the different Climates they come from, and be set into the House sooner or later, as they are more or less tender.

We have two Sorts of the *Canna Indica*, or *Indian Cane*; one with plain green *Leaves*, and the other with variegated *Leaves*; they both flower in the Autumn, producing Spikes of scarlet Blossoms extreamly beautiful: The First is raised from Seeds sown in *March* upon a *Hot Bed*, and may be increas'd by parting the Roots in the same Month, and so the strip'd sort also is propagated by *Off-sets*; for the *Seeds* of the strip'd Kind, which often ripen in *England*, will produce Plants with plain *Leaves*: They delight in a sandy Soil, and little Water, and must be housed with the *Orange-Tree*.

Of the *Genista* we have several sorts which are cultivated in *Green-Houses*; they

all love a sandy dry Soil, and are always propagated from *Seeds*, for *Cuttings* will not take Root, neither do I believe *Layers* will succeed any better; as most of them have few spongy or parenchymous Parts, they require little Water, and should be housed according to their Climates.

The *Palm* or *Date-Trees*, are only propagated by setting the *Date-Stones* in light Earth in *March*, and giving them the assistance of a *Hot Bed*; they are indeed slow Growers, but indifferently hardy; they grow in *Italy* without any Shelter, and I believe might be brought to stand abroad in *England*, after giving them Shelter for the three or four first Years.

The *Jalop-Tree* of *Carolina*, call'd in *Virginia*, *Poke*, is a Plant that dies to the Root every *Winter*, and rises again in the Spring to the height of eight or ten Foot, having many Branches of a red Colour, the Leaves smooth and of a pleasant green; the Berries are like *Elder-Berries*, but grow in long Bunches somewhat like *Grapes*; these are used for dying Red; the young Tops are pleasant and wholesome when they are well boiled, and are frequently eaten by the People of *Virginia*; but if we gather them too old they purge and vomit violently: The *Pidgeon* and other Birds are very greedy of the *Berries* of this Plant; a *Drachm* of the Root dry'd and powder'd (says my Correspondent)

respondent) is a very safe and good Purge, very much like *Jalap*, and is frequently used by the *Indians*; this is rais'd from the Berries sown early in the Spring on a *Hot Bed*, and delights in a rich warm Soil; it should be housed with the *Orange*.

The *Pitchumon*, or *Persimon-Plum*, call'd by the *Indians* *Putchimon*, is a Plant of *Virginia*, where it grows to the Size of a common *Cherry-Tree*; the Wood is white, and the Leaves very green and shining on the upper Side; the Fruit somewhat like a *Medlar*, with several Seeds in it; when it is ripe is soft and luscious: This Plant may be propagated by sowing the Seeds in *March*, like the former. It loves a light Soil, and little Water, and may be housed with the foregoing Plant.

The *Side-Saddle Flower* is a Plant growing in *Virginia* and *Carolina*, which according to the Description I have had of it, with its Seeds which I have receiv'd from several Hands this Spring, is one of the most surprising Plants of those Countries; it dies every Year to the Root, and rises afresh every Spring, putting forth at that time a yellow Flower upon a slender Foot-Stalk with six Leaves, shaped somewhat like those of the *Flower-de-luce* upon the top of the Stile grows a sort of Canopy, round on the Top like the Seat of a Side-Saddle, under which is the Seed-Vessel, divided into six

Cells; the Plant follows the Flower, growing about a Foot high, and somewhat shaped like a *Trumpet*; upon the Top of which is a Leaf like the Lid of a *Can*, which is, at the first coming up very green, but afterwards becomes yellow, full of purple Veins; this grows in spongy Ground in watery Places, so that it must be sown in Pots of Earth, as nearly imitating Bogs as can be, and set upon *Hot Beds*, minding to refresh the Earth constantly with Water as it begins to dry; house this with the foregoing Plant.

Virginian Dog-Wood makes a Tree about the Size of the common *Cherry-Tree* blooming early in the Spring; the Flowers are white, growing in Branches, and are succeeded by red Berries, which hang a long time upon the Tree: Sow them in Pots of light Earth in Autum, and let them stand the *Winter* in the *Green-House*, giving them the assistance of a *Hot Bed* the following Spring. The *Indians* boil the Roots of this Plant in Water, which they account good to heal Wounds.

The *Sassafras-Tree* is also a Plant of *Virginia*, whose Figure we may see in *Gerhard's Herbal*, but the Description is imperfect: It loses its Leaves in the Winter, and in the Spring puts forth its Flowers of a yellow Colour in Clusters, succeeded by blue Berries, somewhat like those of the *Laurustinus*,
upon

upon red Foot-stalks : These Berries should be sown at Autum like those of the foregoing Plant ; it loves a light Soil, and I believe it might be made to grow in our Woods after it is a little harden'd and used to our Climate.

The *Virginia Wild Crab-Tree* has Blossoms somewhat like the *Apple*, but very pleasant to the Smell ; it bears small Fruit, of a yellowish Colour, and well scented, which the *Indians* preserve in *Sugar* : This is raised from Seeds sown in *March* upon *Hot Beds*, and loves a light dry Soil ; house it with the others of this Country 'till it becomes hardy enough to be planted abroad.

The *Virginia Myrtle*, or *Candle-Berry Tree*, is Evergreen, and Aromatick ; it bears Berries about the Size of a small *Vetch*, from which is drawn the *Green Wax* which *Candles* are made of : This *Wax* partakes so much of the natural Scent of the *Plant*, that the least Bit of it being burnt upon Coals will perfume a whole Room. The Berries must be sown at Autumn in Pots of black sandy Earth, and kept continually moist, as well before they sprout, as after they come up ; let this be housed with the foregoing Plant.

It would be endless to enumerate the several Trees and Shrubs of foreign Countries that are propagated in *Green-Houses* ; and I doubt not but such as will mind the fore-

foregoing Directions in this Chapter, will easily, from Experience, discover the right *Culture* of whatever *Plants* they get into their Collection. In the mean time I shall proceed to lay down the best Methods of treating such kinds of *Plants* as abound in Juice, and are called *Succulent Plants*.



CHAP. V.

Of *ALOES*, *TORCH-THISTLES*, *MELON-THISTLES*, *FIG-MARYGOLD*, *HOUSE-LEEKs*, the *EUPHORBIA*, and other *Succulent Exotick Plants*, *their Culture*.

THE *Plants* which I design to treat of in this Chapter are commonly stiled *Succulent*, for that they are plump and full of Juice, which they chiefly gather from the Air, as by Experience we find, witness the *Sempervive*, a kind of *Aloe*, which will live some Years without Earth or Water, being hung up in a Room, and the the *Sedum Arborescens*, which I have known to be kept after the same manner for many Years; in which *Plant* it is observable, that against Rain it puts forth Roots or little Fibres striking into the Air, which in damp Seasons is thick enough to afford

afford it that Help, and some Nourishment; but as soon as the Air begins to grow thinner, and is more rarified, those Roots dry up before they can provide themselves with Nourishment sufficient to supply the Plant they spring from, which perhaps they would do, if they could enjoy that thicken'd Air three or four Months without Alteration.

The first Kind of *succulent Plant* I shall mention is the *Aloe*, which in my Opinion is the most beautiful Tribe of *Plants* belonging to the *Green-House*. The most common Kind in our *Gardens*, with some few other sorts, are brought from *America*; but the greatest Varieties of them, and I think the best Kinds, come from *Africa*, chiefly from the *Cape of Good Hope*. *Aloes*, for the most part, are compos'd of many succulent Leaves, long and sharp at their Points, commonly arm'd with *Spines*: The Leaves spring immediately from the Root, and are placed in a Round, representing the Rays of the Sun, from their Center shoots forth the Flower *Stem*, which sometimes divides it self into Branches, but not always: Upon these *Stems* appear the Flowers which are *monopetalous*, but oftentimes are so deeply cut on the Edges, that without strict Examination they appear to have six *Petals*; they are the most like the Flowers of the *Hyacinth* in their Figure, but are seldom sweet-

sweet-scented, and each Fruit has little black Seeds in it, lodged in three separate Cells.

Some *Aloes* are arboreſcent, inclining to make large Trees, breaking forth into Branches; as one ſort which has Leaves ſomewhat ſhaped like thoſe of a *Narciffus*, but larger, more ſucculent, and of a whiteiſh Colour; but this is ſo rare, that I know not of any Plant of it in *England*, but what I brought with me from abroad, and have now growing: We have other Kinds which are ſo ſmall that a whole Plant does not exceed the bigneſs of a Crown-piece; ſome grow cloſe to the Ground, others are more aſpiring, and have their Crown of Leaves raiſed upon a Stem ſomewhat above the Earth: In ſhort, they are ſurpriſingly different from one another, and deſerve our Care and Admiration as much as any Plant whatever.

I have ſeen about fixty different Kinds of *Aloes* in the *Phyſick Garden of Amſterdam*, chiefly the Product of the *Cape of Good-Hope*; ſome of them have been raiſed from Seeds from that Place, and others from young Plants riſing from the Roots, or putting forth from the Stems; theſe are uſed with great Tenderneſs in *Holland*; but I find they are as hardy as any other Plant growing about the *Cape*; for of the forty Sorts, which I have cultivated for the
three

three last Years, I have not lost one by Cold, but I find it is Wet chiefly that injures them. In *Africa* they all grow in Stony Places, and upon Rocky Ground; therefore the Earth I prepare for them is one half sandy Soil, and the other Rubbish of old Walls well sifted and mix'd together, which contributes to keep them from rotting at the Roots; and in Planting them, I observe always to set them very shallow in the Pots, raising the Earth in that manner, that the *Plant* stands as it were upon a Hill, falling every way to the Edge of the Pot; so that when they require any Water, it may be given them without touching any part of the *Plant*; which if it should so happen, unless the Sun immediately dries it up, the *Plant* would be in danger of rotting.

In the *Summer* indeed, when they are abroad, a little Rain will not hurt them, because they then cannot remain wet very long, otherwise the Wet that will infallibly fettle in the Heart of the *Plants* when the Rain falls upon them would destroy 'em: I therefore chuse to keep them in the House 'till *June*, and return them thither from abroad in *August*, to avoid the Danger of too much Moisture, which they can hardly meet with between those Months.

While they are abroad, if the Weather be fair, they will require moderate Waterings once a Week, if their Earth is very dry:

dry: And from the time of their Housing, 'till the middle of *October*, gentle Refreshings may be given them in the Mornings, while the Sun is upon them, for then is the time of their Growth: But from *October* to the middle of *March*, or thereabouts, they must be kept very dry, and not have the least Moisture, tho' the Earth be like Powder; for they cannot dispence with any Wet 'till the Sun begins to grow powerful with us, and can dry it immediately. In *May* give them fresh Earth and they may be transplanted at that Season, but without disturbing the Roots: But the best time of the Year for that Work is the beginning of *August*, when they will best be disposed to make fresh Roots; and this must be done about ten Days before they are set into the House, for the open Air helps them to strike the Roots, as I shall endeavour to prove.

I once had some Off-sets and Branches of *Aloes* sent me in *May*, without any Roots; and after having let them lie in the Sun for three or four Days to dry and heal the wounded Parts, I put them in *Hot Beds*, according to the usual Method; but with all the Art I could use to them, I found they sensibly declin'd, 'till at last they were reduced almost to nothing; I then so far despair'd of saving them, finding the Summer almost past, that in the beginning of *August* I flung them out of my *Garden* carelessly,
with

with some other things that had suffer'd in the same manner; but to my great Surprise, after they had lain abroad about three Weeks they struck Roots into the Ground they lay upon, and began to shoot out fresh Leaves: By this Accident I not only saved the *Plants*, but took such Methods for the Management of others of the like Kind, that now I do not know any *Plants* in better Health than my own; and I find the best Season for Planting the Off-sets of *Aloes* is about the middle of *July*, letting them stand abroad about ten Days, and take the Rain if possible; when they begin to strike Root, then they may be help'd with a *Hot Bed*, but not before. The Seeds of many Sorts ripen in *England*, and may be sown upon *Hot Beds* in *April*.

I observe that such *Aloes* as put out their Off-sets above Ground, *i. e.* from the side of their Stems, may be made to set out those young Shoots for Increase, by taking away some of the under Leaves which grow next the Earth; for from those places where the Leaves have grown will always shoot forth young *Aloes*; but this Work should be carefully done without bruising the Stem or other Leaves, and at such a time in the *Summer*, when the *Sun* is in its greatest force: For altho' the Leaves will easily peel from the Body of the Plant without breaking, yet there will be a Moisture remaining about
the

the Part they were join'd to, which would breed Moldiness, and be apt to rot if it was not quickly dry'd up.

This and all other *succulent Plants* are so sensible of the least Bruise, that I have known many die by that Accident ; to pinch one single Leaf will mortifie a whole Plant, unless the bruised Part be presently cut off.

We may see the Figures of many kinds of *Aloes* in Dr. *Comelins's* curious Books of *Plants* ; many of which He has given us, with their *Flowers*, and are extreamly well design'd. The more hardy this kind of Plant is kept, the more apt it is to flower, which I know from Experience, having not less than twelve Sorts, which blossom with me every Year.

The *Torch Thistle*, or *Cereus*, is a Plant very different from any other Tribe of *Plants*, in that it never bears any Leaves. I have cultivated about seven Sorts of it, without reckoning those other Kinds of *Torch-like Plants*, which have milky Juice, and are reckon'd of the *Euphorbium* Race. I do not yet find that any of the *Torch Thistles* grow in any other part of the World but in *America* ; nor can I learn that the *Euphorbiums* are found any where naturally growing but in *Africa*. The *Torch Thistles* are of two Sorts ; some creeping upon the Ground, and the others growing upright to a great Height without support. The creeping Kinds are

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more

more enclining to branch than the others, and take Root easily as they run upon the Ground: The Branches of the creeping Kinds are differently shaped, in that one sort pretty common in *England* has triangular Branches, and the other has its Sprouts divided into six or seven Angles; both these have the Edges of their Angles adorn'd with small tender Spines set together in the form of Stars: The Flowers of the first I have not yet seen, but the latter has blossom'd in *England*, which yet perhaps it would not have done without an Accident: A large *Plant* of it that stood in the Neighbourhood of a plaister'd Wall, struck its Roots into it, and soon after dying at its first Root, it remain'd some time nourish'd by the Wall only, and in that condition set for Flowering: The Blossoms were very large, radiated somewhat like the *Sun-Flower*; many of the *Petals* were of a yellow Colour, with some few, towards the middle, of a fair White. This Flower stood upon the Summit of the Fruit, like those of the *Indian-Fig*; and when it open'd was extreamly well scented, but soon decay'd. Whoever considers that this *Plant* grows naturally upon Rocks, will not wonder at its Flowering when it grew in Lime Morter, which comes the nearest to a Rocky Soil of any we can compose.

I have therefore chose to plant both these creeping Kinds of *Torch-Thistles* in Rubbish

of old Walls mix'd with about one Third of sandy Soil, and some small pieces of Free-Stone among it ; for this Mixture will keep the Roots dry, and grow hard as a Rock, after it has been well water'd: These are both raised from Cuttings planted in this Mixture any time between *May* and the end of *July* ; but we must first observe, that they lie in the Sun for a Day or two after they are cut, to heal their Wounds, and not put them into the Ground before they are dry'd, which we must also remember to do with all Cuttings of *succulent Plants*. Plant these as I direct for the *Aloes*, upon a little Hill in the middle of the Pot, for they can hardly endure Water: Let them, after Planting, stand abroad about twenty Days to take Root before they are put into the *Hot Bed*, for else they will be apt to shrink ; and at first putting them in Pots, water them to settle the Earth, but with this Caution, that it be done when the Sun has power enough to dry and harden the Mixture they are planted in. During the *Summer* they may now and then be gently refresh'd ; but from the middle of *September* 'till *May* I would not advise any Water: Some have planted them in light sandy Soil, and they have shot well in the *Summer*, but would seldom live 'till the Spring: In a word, keep them as dry as possible in the Winter, and let them have the open Air (after Rain especially) in the *Summer*,

Summer, as much as you can give them; for 'tis what they chiefly feed upon, as we may know by their putting out of long *Fibres* from their Branches at such Seasons. This kind of Plant comes from those Parts of *America* near the *Line*, therefore are not so hardy as *Aloes*, and should be kept more in the House, and set in the warmest Places.

The *Erect*, or *Upright Kinds*, have generally much larger Stems or Branches than the others, and the *Spines* upon their Edges very strong, which are various in their Length and Colour, as the *Plants* they belong to are different; and the several Kinds of this *Plant* likewise differ in their Colour and Number of *Ribs* or *Angles*. The Upright Sorts, as I observe, never offer to put out any Branches as long as their first Stem can preserve its Top from damage; but as soon as that is crop'd or injured, then they commonly put forth fresh Shoots near the place where it was cut or broke off, about three or four in Number, which grow upright. Sometimes the *Great Upright Torch-Thistle* will continue growing in one Stem 'till it be near twenty Foot high, without putting out any Buds but those for Blossoms: The Flowers are radiated with whitish *Petals*, which do not open 'till the Fruit upon which they stand seems to be full grown. This Kind, as well as the others of this

Tribe, is easily raised from Cuttings planted in any of the *Summer* Months, but best in *May*, to cut a Stem of any of them into pieces of six or seven Inches long, and let them lie in the *Sun* 'till their Wounds are dry; every Cutting will soon take Root if they be set in Pots of light Earth, and kept pretty dry 'till they begin to shoot, and then some of the Mixture prepared for the Creeping Kinds should be put to their Roots, and as much of the light Earth as possible taken away: The reason why I do not chuse to plant them in this Mixture at first, is because the Roots will more readily form themselves in the other Earth. When these *Plants* begin to grow they will put out little Buttons near their Tops, which will afterwards form so many Stems, excepting only that Cutting, which was the running Top of the *Plant*, and that will shoot upright. When the little Stems are about four or five Inches long they may be cut; and after drying in the *Sun*, be planted like the others.

I can say no more concerning these *Plants* than I have done of the Creeping Kinds, unless it be that what I call the *Great Upright Torch-Thistle* is easily preserv'd in any *Green-House*, and is not so hard to be kept as the others; that is, it will thrive better in a plain sandy Soil than in the Mixture I have prescrib'd for the others of this Tribe, and will bear more Water in the Summer. The

Figures

Figures of all these Kinds, I think, are nowhere cut but in my *History of Succulent Plants*.

The *Melon-Thistle*, or *Echinomelocactus*, is a very wonderful Plant; I have had only two Sorts of it, viz. the large Kind growing in *St. Christophers* and other *Caribby Islands*, which is cut in *Gerard's Herbal*; and the small Kind, which is figured in the *Paradisus Batavus*, named in that Book *Echinomelocactus minor Lactescens absque tomento Cylindris Strictioribus*.

The first is a solid Plant growing out of the Ground like the Fruit of a large *Pumkin*, but ribb'd like a *Melon*, and very green; upon the Edges of each Rib are long *Star-like Thorns*, placed one above another, of a *Coffee Colour*: On the Top of this *Melon-like Plant* grows a large Lump of a *Cotton-like Substance*, cover'd over on the Outside with short tender *Spines* of a *Cinamon Colour*; out of this burst forth the Fruit (in a hot Day) full ripe, about the Size and Colour of *Cornelian Cherries*, and commonly drop off two Hours afterward. There is now one of these Plants in the Stove at *Hampton-Court*; it is called in *Barbadoes*, *Popes-Head*, or *Turks-Cap*.

The other Sort seldom exceeds the bigness of a large *Apple*, growing out of the Ground like a solid Fruit, and cover'd over with little Knots, somewhat resembling green

Berberrets set close together, and little Stars of Thorns at their Points, of a *Cinamon* Colour; the Fruit of this, like the former, cracks out in hot Weather, full ripe, of the Shape and Colour of a ripe *Berberry*, but these remain upon the Plant a long time. I could have been more particular about the Description of these strange Plants, but as they will be engraved and described in my third *Decade of Succulent Plants*, I shall therefore refer my Reader to that Account of them.

These both grow upon Rocks in *America*, near the *Line*, so that they are very tender; but being humour'd in their way with a proper Soil, and kept dry, may be preserv'd as well as the *Torch-Thistles*: I have rais'd the small Kinds from Seeds sown in *Lime-Rubbish*, which I afterwards preserv'd for some time, but they were not hardy enough to resist the hard *Winter*. The best way to provide our selves with these Plants, is to have them brought from *America* well grown, and kept without Water during their Passage.

The *Indian-Fig*, or *Prickly-Pear*, is called *Opuntia* and *Ficus Indica*; there are many different Kinds of this Plant chiefly growing in *America*, from whence I have had about eight or nine distinct Sorts: This Race of Plants are said to grow one Leaf out of another, but they are rather Branches than Leaves;

Leaves; the Leaves properly being those little Buds which appear always on those Parts where the Thorns afterward put forth. However, since what I take to be Branches have generally been call'd Leaves, I shall yet continue that Name to 'em. This Tribe of *Plants* then, differ chiefly from one another in the Size of their Leaves, the Colour of their Flowers and Fruit, and the Length and Colour of their Spines; the Leaves of all of them are generally of an Oval Figure; some Sorts have them near a Foot in length, and others not more than two or three Inches; their Leaves are generally set with Knots of Thorns at certain Distances; some so very long, that the *Indians* make use of them as Pins: Others have the Thorns so short, that they are hardly to be perceiv'd, and those small Thorns make the *Cow-Itch*, and can hardly be got out of ones Flesh in a Month, if they are not carefully sought after at first: In this Tribe the Fruit always appears before the Flower; and when it seems to be full grown the Blossom opens at the End of it, with about ten *Petals* and a Cluster of *Chives* in the Middle: This Flower always opens in the Heat of the Day, and shuts up when the *Sun* leaves it: When the Fruit is ripe it is generally of a strong red Colour, and has this Singularity in it, that if it be eaten it will make the Urine of the Person as red as

Blood, but without any ill Effect; the Flowers are commonly Yellow, excepting one sort, which bears Scarlet Blossoms, and is more tender, and hard to be kept than any of the others, and very apt to rot: Some of them delight to creep upon the Ground, others grows more upright; but all of them delight in Stoney Places and Rocks; therefore I give them Earth made with Lime-Rubbish and sandy Soil in equal Quantities, planting them in Pots, as I do the *Aloes*, upon little Hills rais'd above the rest of the Earth; they may for the most part be water'd like the *Torch-Thistles*, and should have Warmth answerable to the Climates they come from. We have a small Sort which comes from *Italy* with round Leaves, that will stand abroad all *Winter*, and bear Fruit plentifully; and the *Carolina* Kind, and the *Virginia* Sort, will likewise live out of Doors under the Shelter of a warm Wall; these are all rais'd by planting single Leaves about two Inches deep in Pots of the prepared Earth (after their Wounds are dry'd) and letting them stand abroad 'till they strike Root, before they have the help of a *Hot Bed*: And I observe, to set them upon Leads, or some Stone Pavement, expos'd to the *Sun*, contributes to make them shoot with greater Vigour: The Plantations of the Leaves should be made in the *Summer* Months, and they should be hous'd with the *Aloes*. The

The *Ficoides* is a Plant so different from other Kinds, that Authors have greatly varied in the Name of it ; some esteem it like the *Crisanthemum*, or *Corn-Marygold* ; others make it a Diminutive of the *Opuntia* or *Indian-Fig* ; and indeed it has this likeness to the latter, that the Fruit is always form'd before the Flower opens, and is not unlike a *Fig* in its Shape : The Flower is radiated somewhat like the *Marygold*, and therefore the *English* Name I give it in my *Decades of Succulent Plants*, is *Fig-Marygold*, which in my Opinion is a Name in our Language as proper for it as *Ficoides* ; the Leaves of this Plant are always succulent, and it is rare to find one in this numerous Tribe that has not conjugated Leaves, that is, Leaves set on in Pairs at the Joynts.

In the *Culture* of fifty sorts of this Plant, I do not remember to have met with one that was not a Native in *Africa*, chiefly about the *Cape of Good Hope*, from whence we receive them ; they commonly grow in stoney or rocky Ground, in such places where they have not much Wet, and are easily propagated either from *Seeds* or *Cuttings* : The *Seeds* may have the help of a moderate *Hot Bed*, if they are sown early in the Spring ; but the *Cuttings* being planted in a Natural Bed of Earth in *May* will prosper very well, and be fit to put into Pots the *August* following, in which Condition

tion they may yet remain abroad 'till about the 20th of *September*, for they delight in the open Air, and are not easily overcome with small Frosts. As to the time of their Duration, I find many of the Shrub Kinds require to be renewed every second or third Year, and likewise the Running or Creeping Kinds; for *Plants* of three Years old often drop off; or if they live, are generally ill-shapen and ragged; it is practised in some places to raise these Cuttings upon a Bed made with *Tanners-Bark*, which is a Mixture that affords a gentle Heat for three or four Months, without ever burning; therefore it would be of great use to raise young *Orange-Trees* upon, or other small *Plants*: Some Kinds of this *Plant* are *annual*, and therefore must be raised from Seeds every Year, as one Sort especially, which of late has been pretty frequent among us; it has at first coming up, Leaves somewhat like those of the *Arrow-head*, cover'd with little Blisters of clear Juice, which appear like so many Diamonds, and give a notable Lustre when the *Sun* shines upon the *Plant*; but as this *Plant* grows bigger, the Leaves grow smaller and change their Figure; it puts out many Branches cover'd with transparent Blisters, and Blossoms about *September*, bearing small white Flowers; but this, like other *Annuals*, will stand the *Winter*, if we raise young *Plants* of it about *July* or *August*,
that

that do not attempt to blossom in 3 or 4 Months. There is another Class of the *Fig-Marygold*, which are *Dwarfs* and *Aloe-form'd*, growing always near the Ground without branching; most of them will remain five or six Years without renewing, but may perhaps be subject to lose some of their Leaves lying next the Earth, if the Surface of the Earth is not cover'd with sifted Lime-Rubbish, which contributes to suck up the Wet, and keep the Leaves from rotting; these Dwarf-Kinds have commonly the most succulent Leaves, and therefore are more endanger'd by Wet than the others; so that I always plant them upon little Hills in the middle of the Pots, as I have advis'd for the *Aloes*: So likewise some of the Creeping Kinds, that have very succulent Leaves and tender Stalks, should have the top of the Earth they run upon cover'd with a thin Coat of Lime-Rubbish, or Sea-Coal Ashes, to prevent their rotting by too much Wet: The Earth for every Kind of this Plant should be light and sandy, with about one fourth Part of Rubbish among it.

The *Shrub* Kinds, which have their Stalks woody, will bear moderate Waterings; but the others, which are more succulent, must have very little Water. This Tribe of *Plants* should always have the Advantage of the Sun, for they will never open their Blossoms without it, excepting two Kinds which only flower in the Night. As I have already

dy publish'd the Figures of many of these Plants, and am still about engraving many more of them in the *History of Succulent Plants*; so I shall refer my Reader to that Work for their particular Forms and Uses; the *Cuttings* of these *Plants* should not be planted before their wounded Parts are dry.

We have great Varieties of *Sedums* or *House-Leeks* from the *Cape of Good Hope*, which are not less beautiful than the *Fig-Marygolds*, and are easily propagated by the same Means. Dr. *Commelin* has given us the Figures of several of them among his *Amsterdam Plants*, and therefore I shall say little relating to them; but the *Tree Kind*, or *Sedum Arborescens*, which is the largest of them, I cannot well pass by, without taking notice of it, as one of the most beautiful *Plants* belonging to the *Green-House*, especially that Sort of it which has its Leaves variegated with Green and Yellow, and also has very often those Leaves tip'd with Purple; it loves a light sandy Soil, and is easily propagated from Branches set in the Earth in any of the *Summer Months*, giving them very little Water, and as much Air and Shade as possible in the *Summer*, and no Water at all in the *Winter*. I observe, the Method I prescribe for them in the *Summer* contributes to make them more beautiful in their Leaves than those that are drawn under *Glasses*, or expos'd to the *Sun*, which is a
com-

common Error : In a word, every Plant that feeds upon the Air, as this does chiefly, must be treated in the same manner, if we have a mind to keep them in their best Colours ; for too much *Sun* to *Aloes*, and such like *Plants*, is apt to change the Colour of their Leaves.

The greatest Varieties of the *Euphorbium* that I have yet seen are in the *Amsterdam Gardens* ; they are in Shape and manner of Growth very like the *Torch-Thistles*, but have not Star-like *Spines* ; however they do not want some Thorns to defend their Edges, which vary in their Figures as the Plants are different : All this Race abound in a poisonous milky Juice, which flows from them in great Abundance when they are wounded ; so that the Cuttings taken from them for Increase, must be well dry'd in the Sun before they are put into the Earth. The Mixture which I direct for the *Torch-Thistles* is the most proper for this kind of Plant, which delights in rocky Soil, and requires very little Water ; these are most of them very tender, like the *Torch-Thistles*, and may be kept in the House all the Year about, and stand in the warmest Place of it : We may raise them in any of the Summer Months with the Help of a *Hot Bed*.

The *Frittilaria Crassa* is a small Creeping Plant, imitating, in the manner of its Growth, the *Torch-Thistles*, shooting one Branch out

of another : It has neither Spines nor Leaves that ever I could discern, but bears very large Flowers about four Inches over, speckled with Black and Yellow, like the Belly of a *Toad* ; and one Sort has its *Petals* cover'd over with purplish Hair or Wool : These Flowers, when they open, have a very ungrateful Smell like *Carion*, and soon are cover'd with little *Insects* about the Centre of their Blossoms. The Stems of the smallest Sort are generally of a brownish Colour ; but the larger Kind has its Stems very green if the Plant be in Health : See the Figures of both these Kinds in the *Hort. Lugd. Bat.* and Dr. *Commelins's* Book of *Amsterdam Plants* ; We may easily propagate these Plants by planting their Branches in a Natural Bed of Earth, any time between *June* and *August*, and they will soon be fit to plant into Pots ; the most proper Earth then for them, is that directed for the *Aloe* : These Plants are very apt to rot, and therefore must be kept dry in the *Winter*, and have a warm Place in the *Green-House*.

I have now given my Reader sufficient Instructions for the propagating of *Exotick Plants* ; and if he should meet with other Kinds than those I have mention'd, I doubt not but he may readily cultivate them, if he discreetly consults the Directions I have given him in this Work.



CHAP. VI.
Of the GENERATION of PLANTS.

AS the Generation of Plants is yet new enough to the World to admit of a further Explanation than what I publish'd in the First Part of this Work, I shall therefore give my Reader the Figures of the Generative Parts of Plants, as I have observ'd them with the Microscope.

Plate II. Figure I.

A The Pedicle or Footstalk of the Tulip Flower.

B The Pistillum of the same.

C One of the Stamina taking Root in the Pedicle of the Tulip.

D The Apex, or Head of the Stamen, which encloseth the Farina Fœcundens, or Male-Seed, in two Cells, which burst open when they are ripe.

Fig. II. Shews the Pistillum or Uterus of the Tulip, cut Horizontally, and magnified with one of Campani's Microscopes.

A The

A The Cavity of the *Vagina*; the *Tunick* of which Passage or Cavity is composed of very small Vessels, which are continued into the several Coats of the *Ovaries*, and the Eggs within them mark'd b b b b b b; all these Vessels seem to take their Rise from three larger Pipes, CCC, thorow which the Sap ascends from the Root in Steam or Vapour.

D D D Shew three large Vessels (whose Sap is in Figure of small *Globules* of a bluish Colour) thorow these Vessels the Sap descends in Liquor.

These large Pipes put forth Branches of Vessels about twenty times less than themselves, which passing horizontally thorow the several *Ovaries*, are divided into smaller *Fibres*, and at length are lost in the *Tunick* of the *Vagina*; — these are all of a pale blue Colour.

E E Direct to the fleshy Part, which seems to be made up of many transparent Protuberances of a pale yellow Colour, lessening themselves as they come nearer to the outward Coat of the *Pistillum*.

Fig. III. Shews the *Pistillum* or *Uterus* of the *Tulip* split lengthways at A, wherein are discover'd two of the *Ovaries* on each side the Passage of the *Vagina*.

B The

B The *Apex* flinging out its Dust which falls upon C the outward *Ostium* of the *Uterus*, composed of spongy Folds, which emit a gummy Liquor.

D One of the *Petals*, or *Flower-Leaves*, taking Root on the *Pedicle*. N. B. This Figure is not magnified.

Fig. IV. Shews part of the *Pistillum*, split like that in the former Figure, but magnified.

A Is the the Cavity of the *Vagina*, into which the *Farina* is supposed to fall.

C Is the Passage of one of the Vessels mark'd C in the second Figure.

DDDD The Tunick of the *Ovary* composed of many small Fibres.

E The Eggs as they are fastened to the *Ovary*.

F A slender Fiber passing lengthways thorough the *Capsula*, and seemingly binding the Eggs together.

Fig. V. Is the *Matrix* of the single *Anemone* surrounded with its *Stamina* and *Apices*; it is to be observed, the Eggs of this Flower are naked, standing on the Outside of a little Button rais'd in the middle of the Flower.

Fig. VI. The Button with the Eggs on its Outside split lengthways.

Fig. VII. A is a *Stamen* with its *Apex* of the *Anemone*, of its natural Size.

B One of the Eggs or Seeds of the same taken off from the Button.

Fig. VIII. The *Stamen*, with the *Apex* of the *Anemone* magnified. — In this Figure, at A, we see the Root of the *Stamen*.

B B B B The length of the *Stamen*, from its Root to the *Apex*, whereby it appears to be a hollow Tube.

C The *Apex* cover'd with its *Farina*.

Fig. IX. Shews us one of the Seeds or Eggs of the *Anemone* magnified, whose outward Coat is cover'd with Capillary Vessels, curl'd and running into one another, with a View of the Neck or Passage, into which the Male-dust is supposed to fall.

So have I now compleated the Work I promis'd in my Title Page, and have endeavour'd to give something new in every Part of the *Art of Gardening* which I have treated of.



F I N I S.



Fig. III



Fig. VI.



Fig. V.

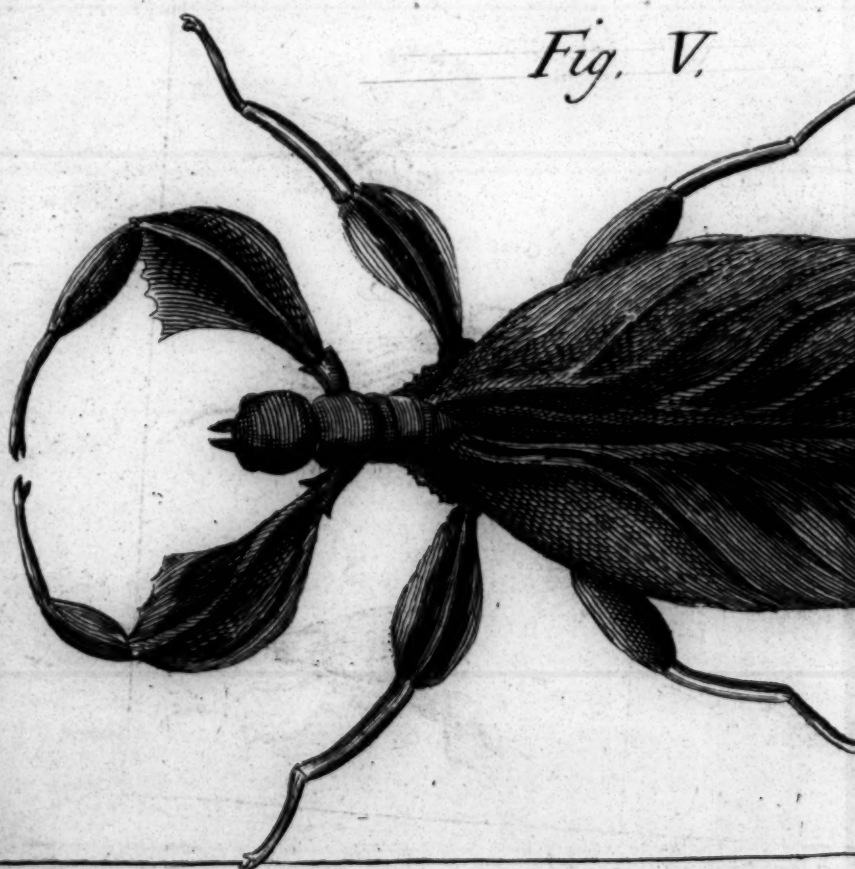




Fig. III

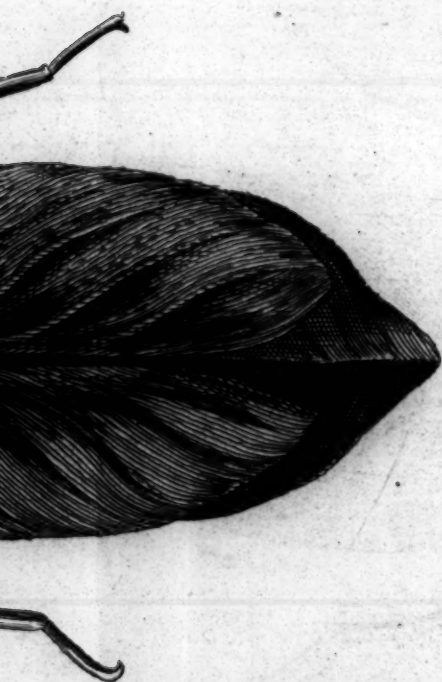


Fig. I



Fig. II.

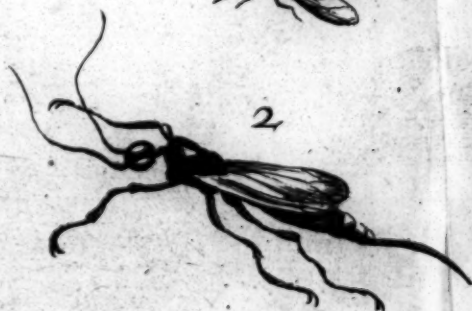


Plate II

Fig I

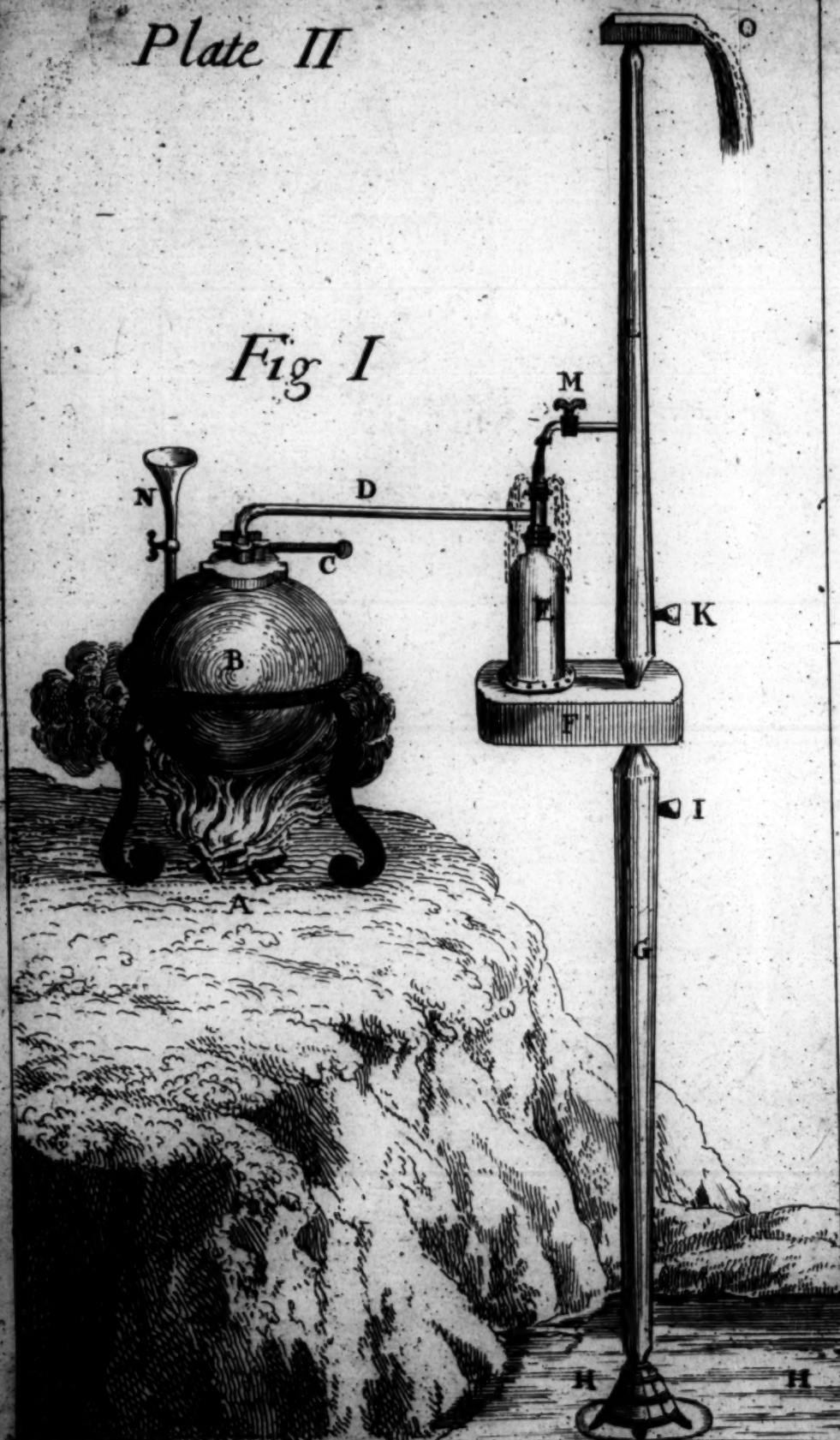


Fig. II.

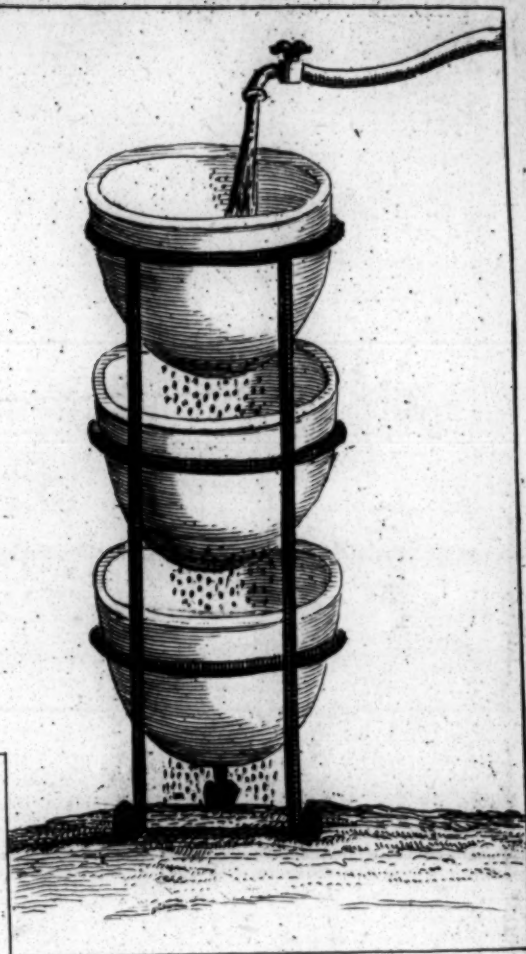


Fig. III.



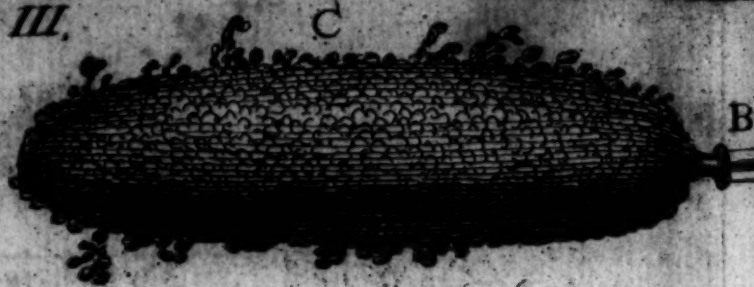
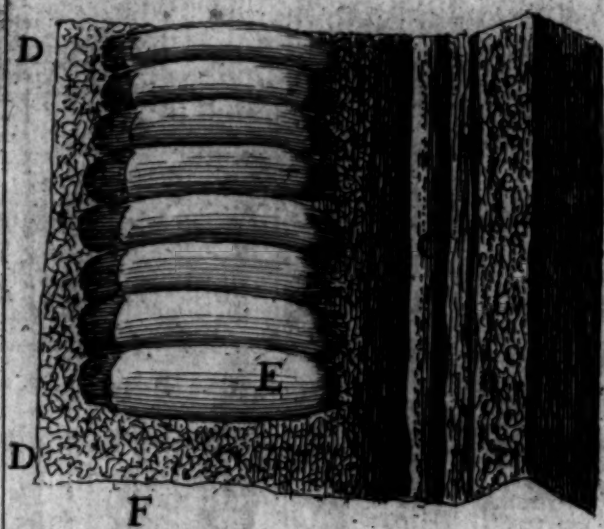


Fig II

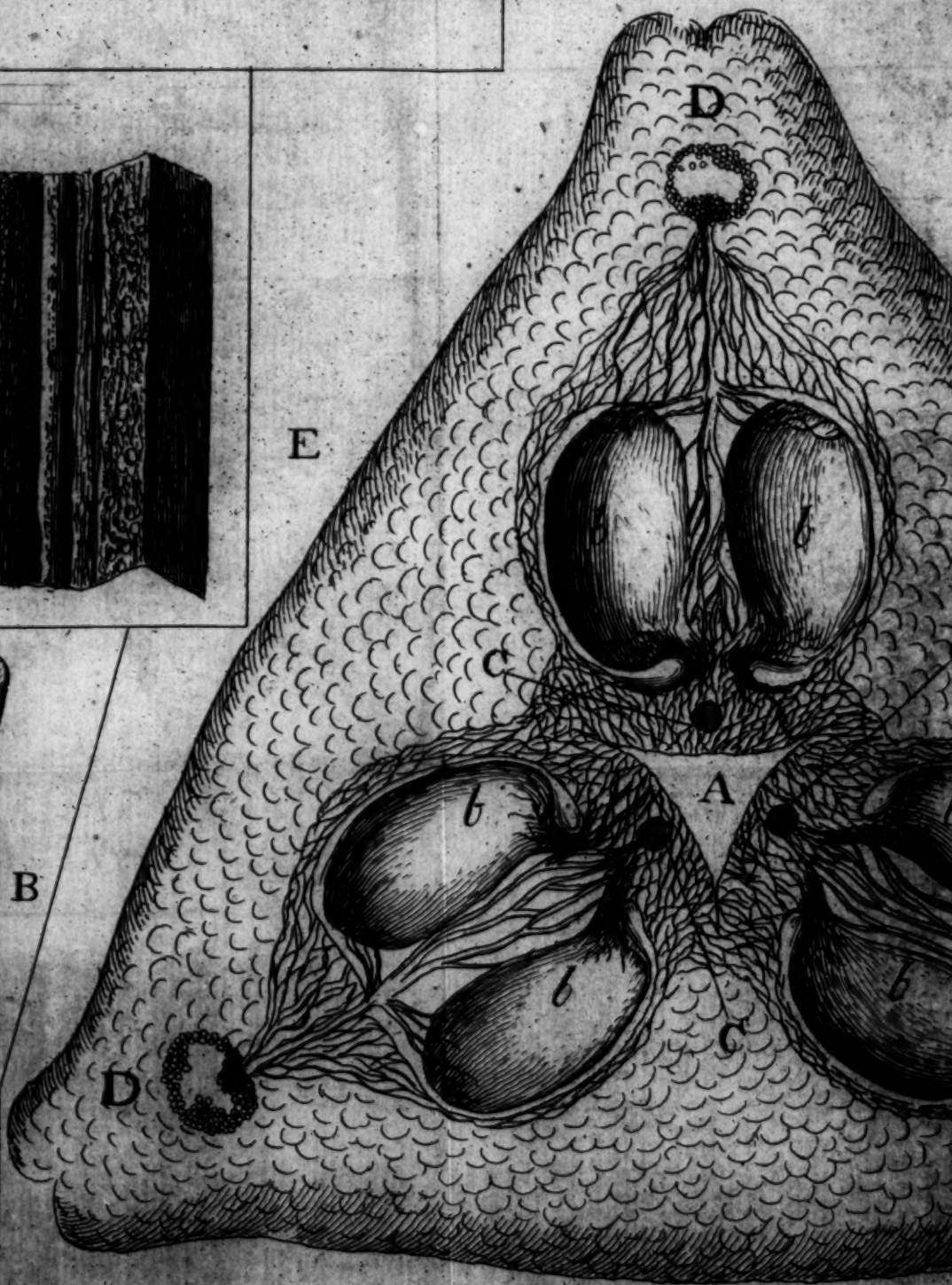
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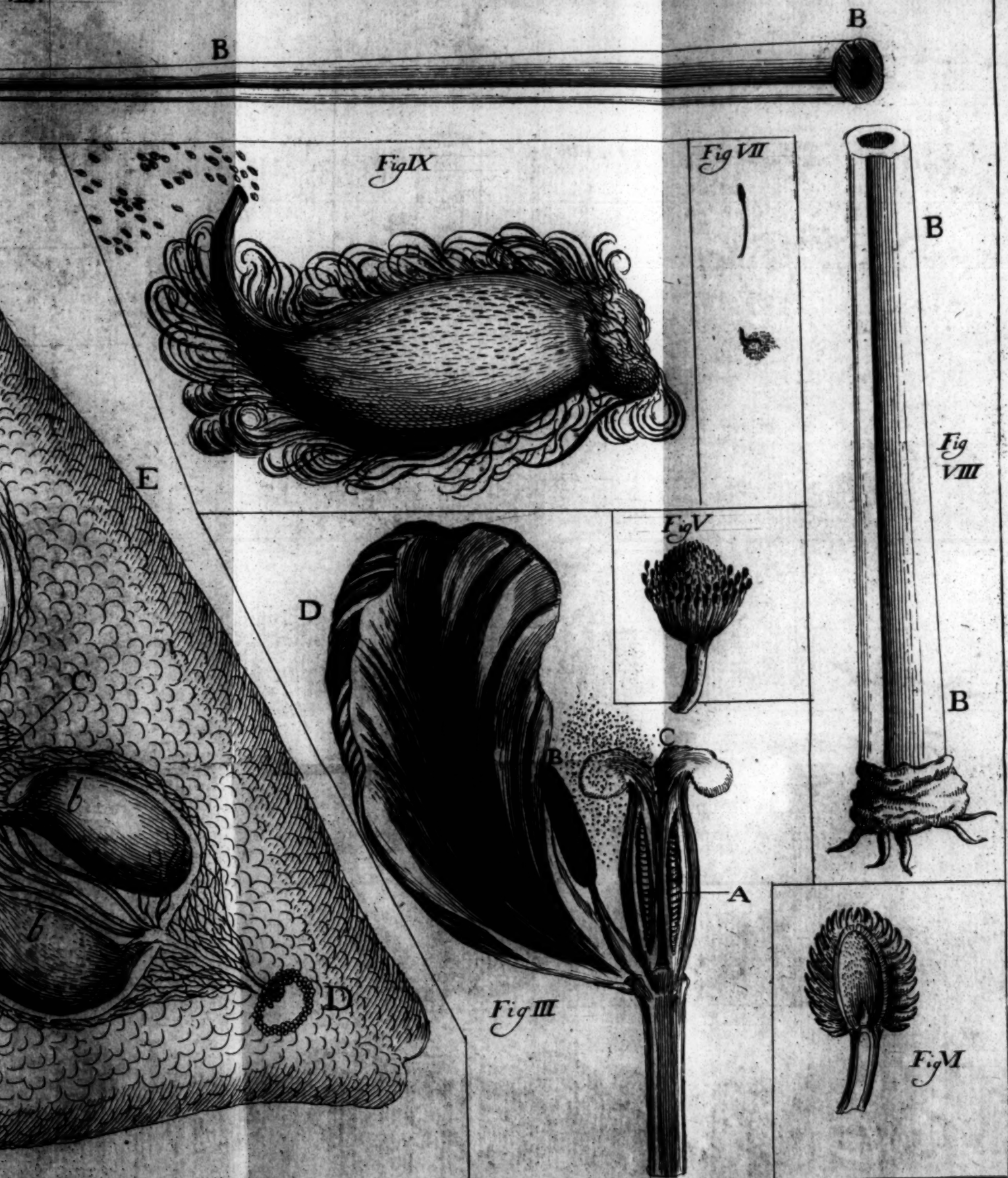
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Fig I



VIII.





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nondum

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